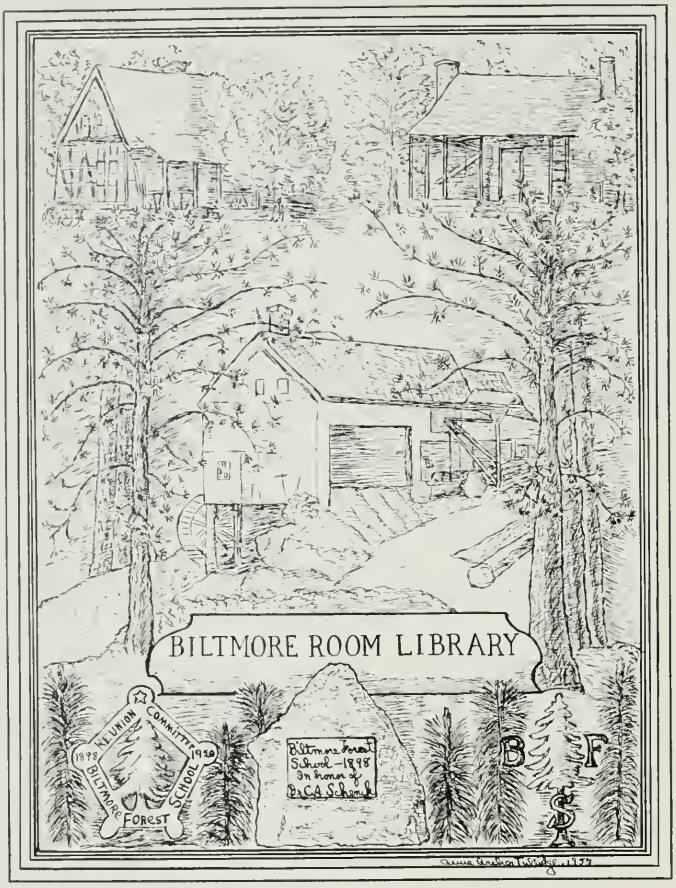
The Tree Doctor

JOHN DAVEY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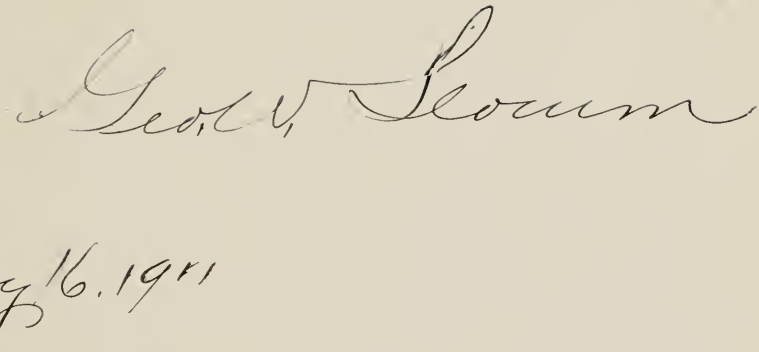

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A Class of Young Men in Our School of Tree Surgery.

The Tree Doctor

THE CARE OF TREES AND PLANTS

PROFUSELY ILLUSTRATED WITH PHOTOGRAPHS

BY

JOHN DAVEY

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SPRING.

The snow has gone, the ice, the cold;
In balmy air the ferns unfold;
From marshy lands "skunk's cabbage" spring;
Birds, just arrived, now joyous sing.

SUMMER.

Hushed be the winds, and quiet reigns,
As old King "Sol" the zenith gains;
The birds all rise at early dawn;
At noon—they seek some shaded lawn.

AUTUMN.

"See the leaves—around us falling—
Dry and withered to the ground,
Thus to thoughtless mortals calling,
With a sad and solemn sound."

WINTER.

The harvest is gathered and the sleigh-bells ring,
Let us feed all the poor, as we merrily sing;
For who can be happy while others are sad?
There is no greater "Mission" than to make others glad.

INTRODUCTION.

The original **Tree Doctor,** notwithstanding its crude form, started a revolution in tree culture in the United States and Canada. Since the first edition has been exhausted, urgent calls have come for a second. In answer to these demands, I have revised the work and now issue it with the following improvements:

First—213 photographs, all of the finest quality.
Second—Photographs generally explained by notes contiguous to them.
Third—Tree surgery described and illustrated in few and simple words.
Fourth—"Pear Blight" and other "Blights" not a disease, but the result of injuries, the source of disease.
Fifth—Cause of "Peach Yellows"—The far-removal of trees from their native environments.
Sixth—Grape culture made simple.
Seventh—A splendid collection of flower photographs. The way to grow them.
Eighth—Special illustrations of vines. How to procure them.
Ninth—Native forests, their destruction, the significance, remedies.
Tenth—Relation between trees, birds and insects.
Eleventh—Numerous photographs illustrating "stiff" and "free" landscaping.
Twelfth—Twenty formulas for the destruction of insects.

This work is sent forth with a fervent prayer for Heaven's blessing on it, and an appeal to all to help in planting and caring for trees in the country that was once pre-eminently **"The Land of Forests."**

THE AUTHOR.

CHAPTER I

INTERIOR STRUCTURE OF A TREE—WHAT FOLLOWS EXPOSURE OF "CELL SYSTEM"—HOW MILLIONS OF TREES HAVE BEEN RUINED—HOW AMPUTATION SHOULD BE PERFORMED—THE CARE OF THE WOUND—HOW NATURE BUILDS A TREE—THE POSSIBLE AGE OF TREES NEVER YET DEMONSTRATED—DESTRUCTIVE WORK OF THE TELEPHONE AND TELEGRAPH COMPANIES—WORK OF IGNORANT "TREE BUTCHERS"—BLUNDERS ARISING FROM INJUDICIOUS PLANTING—PROPER PLACE TO PLANT—STATES SHOULD ENACT LAWS AUTHORIZING ALL CITIES, VILLAGES AND TOWNS TO PUT TREES ON STREETS UNDER SUPERVISION OF A FORESTER.

It was not designed by the all-wise Creator that animals, plants, or any living creature should drag through life in a diseased or half-dead condition. Perfect happiness comes from obedience to Supreme Law, resulting in what we call "health," which is the normal condition of bodies existing in harmony with the Divine Will. The infant who inherits a sound constitution, and never violates the laws of his being, enjoys, as a reward, a state of perfect health. There is not a mental malady or bodily deformity in existence but has back of it an efficient "cause." In all my study—in the sixty years that I have been permitted to live—I find that in the physical universe; in the physical, mental, moral and spiritual make-up of man; in the lower animals, and in the vegetable kingdom, "The Laws of God are One," and no man can understand a tree, shrub or plant until he not only says but realizes that (when speaking of or contemplating a tree), "that tree is a living creature." This fact will be discussed further on when describing leaves, roots, etc.

The moment you say "Life," what do you imply? All the

laws that go to make that life healthy or unhealthy, do you not? The average person has no clearer conception of the "Law of Life" in a tree than he has of how the moon performs its circuit. In one case he says, "The tree's alive;" in the other, "The moon is held by the law of gravitation." That seems to be the end of his explanation and the extent of his knowledge.

In Photo 1 are seen three apples, Fallawalters. The middle one is perfect. Why? From a healthy tree. Fortunately our

Photo 1, Fallawalters.

good, everyday commonsense tells us this is what we can expect. The one on either side (there were bushels of them under the tree) is diseased. Why? Look at Photo 2. How can you get sound fruit from a diseased tree?

Examine a leaf. How many will see its beauty, saying nothing of its utility? Did you ever stop to think that all the countless millions of tons of timber ever grown were made in the leaf? Yes, every twig, lateral and main branch, trunk, root and all were made in the leaf. Now what does it mean when you cut off a live branch? You have destroyed both respiration and circulation.

Attention is here called to the marvelous cell system in the

Photo 2
The Bearer of Unsound Fruit.

structure of the trunk, branches and twigs. Nothing could be more educational than to turn back to your botany and see how beautifully this system is built. Remember, the **upward** flow of sap is not under the bark, where you see such a copious supply of a liquid something that you call "sap;" for this is not "sap," but "cambium," as the scientists call it; it is sap that has been "worked over," so to speak, in the leaf; it might be called "tree blood," (it answers to blood in the animal body) and it returns **under** the bark, between that and the last year's new wood, building another new layer. Now, bear this in mind, viz; in its upward flow it is **inside**, within the cells of the wood.

Now, look at the hideous wounds in Photos 3, 4 and 5 (and there are millions worse than these.) After pure sap has started from the roots and then has to pass through this sickening virus, can you reasonably expect that when it comes to the factory—

the leaf—that pure "blood" can be manufactured from impure material? You probably had not thought of this; but is it not

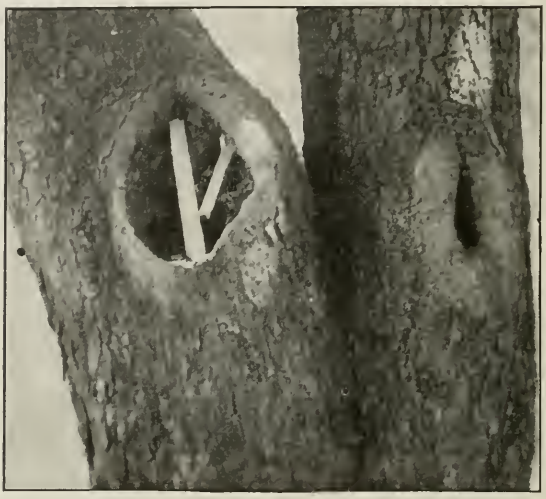

Photo 3, A Wounded Tree.

self-evident that perfectly pure, sound fruit cannot be manufactured from polluted material? The lesson is, if you desire pure,

Photo 4, A Hideous Wound.

sound, wholesome fruit, don't subject your trees to all kinds of fungous and scrofulous diseases. The sap that goes into the leaf is changed and passes on, but all that which goes into the fruit, pure or impure, remains there.

The inflicting of a wound on a tree is neither destructive nor injurious to any great extent if the structure of a tree is understood and the wound is properly cared for; but the **ignorance of tree life,** on the part of the so-called "Tree men," has resulted in shortening the existence of orchards and shade trees at least four-fifths of their natural lives, and disfiguring them to such an extent that it would be advantageous to pull out nine-tenths of the old trees and replace with young and healthy ones.

In Photo 6 you see how the farmer, and the ignorant city or town "Tree man" does the work. They cut off, leaving a stub, as shown in the middle specimen. This had been cut one year, and

Photo 5

Correctly Cut, but Wound not Dressed.

Photo 6
Every Branch has a Shoulder.

Photo 7
A large Wound that will Heal.

you see that death had set in and that the bark had peeled off. In a few years the stub rots out, leaving a hole, as you see in the sample to the right. In Photo 5 you have a case where the cut was made right but the wound was not dressed. Decay set in and the rot worked down more than two feet.

In every branch there is what we call a "shoulder." It is a prominent ridge. To make it plain (in Photo 6) the saw has been run in back of the "shoulder," and a piece of paper laid in. The proper place to make the final cut is about an inch further out. In dropping a large branch it is well to cut the branch off some way out, to get rid of its weight, then make the finishing cut in the proper place.

Photo 8

Tree shown in Photo 7 Five Years Later.

Photo 7 was used in the old "Tree Doctor." It presents a large wound, with little Roy Marsh standing by it. Five years have elapsed and Roy has grown taller and the wound smaller, as you see in Photo 8. You can take off the half of a tree, or indeed more, and if you will watch the wound and keep it painted it will heal just as nicely as the wounds are healing in Photo 10. Any thick paint or coal tar will do. The paint is to keep out the moisture and preserve the wood until nature can close it over with a new growth.

In Photo 11 is presented a case where, twelve or fifteen years ago, some stupid fellow removed two branches from a Rhode Island Greening tree, and left the wounds unprotected. The whole interior of the "head" is rotted out and the two men

Photo 9

Use Tile to Protect Young Trees.

Photo 10

Wounds rightly Treated will Heal.

are shaking hands through the tree, while "Uncle Sam" (on the opposite side) is putting in a few cast-iron epithets on the ignoramus who ruined the tree.

An Apple tree should be in a good state of bearing when two hundred years old. In planting apple orchards, never take trees that have been "headed back;" select the one with the "leader," that is, a straight stem. Slip over this a four-inch socket tile, such as you see in Photo 9. Stuff in some old burlap, carpet or any cloth, so that the tree will not become chafed in the swaying of the wind. This keeps the rabbits from gnawing the bark and prevents whiffletrees from "barking" them when teams are working among the young trees. About the time the tree has filled

the tile, give the tile a tap with the hammer, and the young tree will be big enough to take care of itself.

In the eastern states, the apple orchards are rapidly dying, killed by the "Scale." This pest multiplies so fast that they actually encrust the bark, covering it up completely, and suck the life of the tree until the orchards are standing dead, as shown in Photo 12. This condition is reported in practically all of

Photo 11
If Neglected, Wounds will Destroy Trees.

eastern New York, and I witnessed the same in New Jersey. This seems to foreshadow a "famine" in the apple crop. It is a matter that should be taken up, and planting done by a host of people who have means. Last fall I had to pay fifteen cents a quart for eating apples in New Rochelle, N. Y., and they were charging six dollars a barrel, wholesale. There is certainly a fine field for people of moderate wealth to invest in apple growing.

Photo 12
Orchard Killed by "Scale."

Photo 13
Rathbone Elm, Marietta, Ohio.

Photo 13 presents a remarkably interesting tree. It is on the Rathbone property in Marietta, Ohio. The house—seen through and beneath the branches—looks like some little playhouse, but it is a structure of more than ordinary size. The

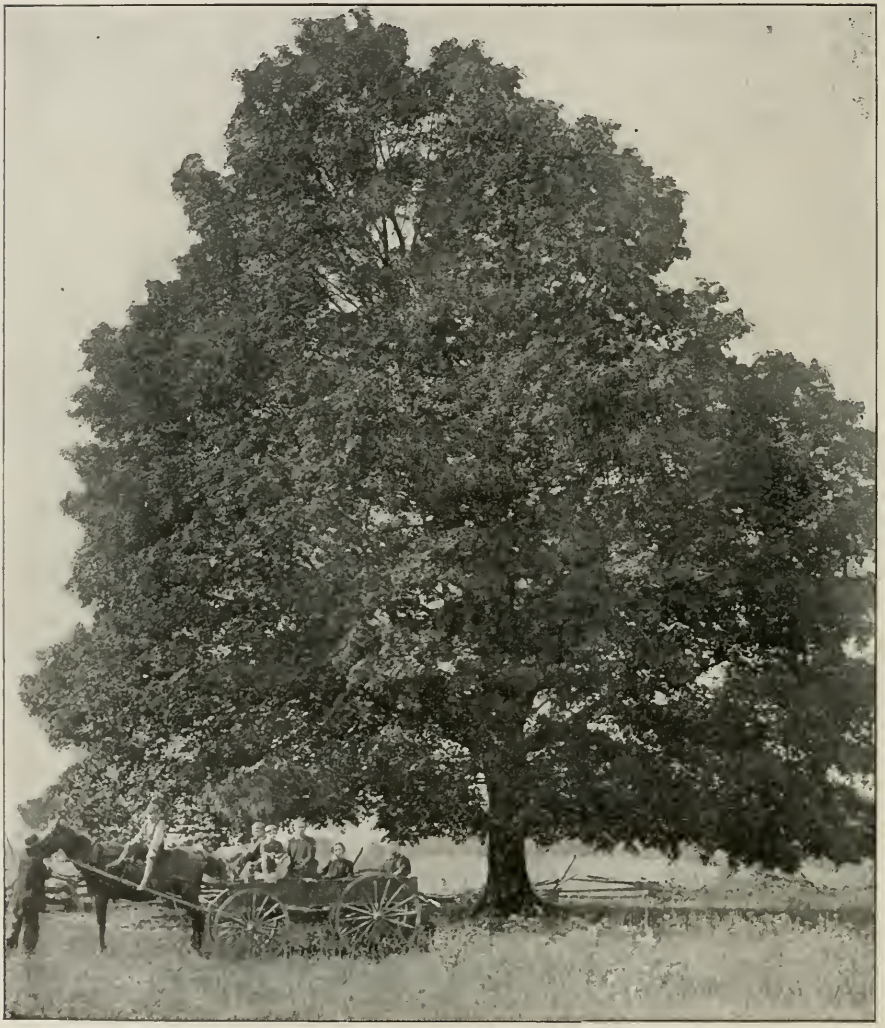

Photo 14
Maple One Hundred Years Old.

spread of the branches of this majestic tree is over one hundred and thirty feet. I have seen but one Elm larger than this, and that is near South Framingham, Mass. The Framingham Elm has about one hundred and fifty feet spread of branches, but it is really a double tree; that is, it divides—near the root—into two trunks. The trunk of this Marietta tree can be seen in Photo 102. The tree now needs a little attention to secure it against the violent force of wind-storms, etc., but otherwise is in

Photo 15

Street beautifully Arched.

a good state of preservation. "Root treatment" would entirely renew the top; and, as it is only about two hundred years old, there is no reason that it could not see two or even three centuries more.

On Dec. 10th, 1904, I gave a stereopticon lecture at Burlington, Vt. Prof. Jones, of the Experiment Station, was present and, at the close, remarked: "I agree with you, Mr. Davey, that the world, as yet, has never tested the possibility of tree life; for

being exogenous in its structural work, (i. e., building on the outside) it naturally follows that, could we control the top from running too high, endangering the tree in wind-storms, and renew the roots, there is no reason that it would not go on and build indefinitely." I wish Prof. Jones's sentiments could be heard the world over; then, in time, in our lawns, instead of having a thicket of brush, we would have specimens of majestic

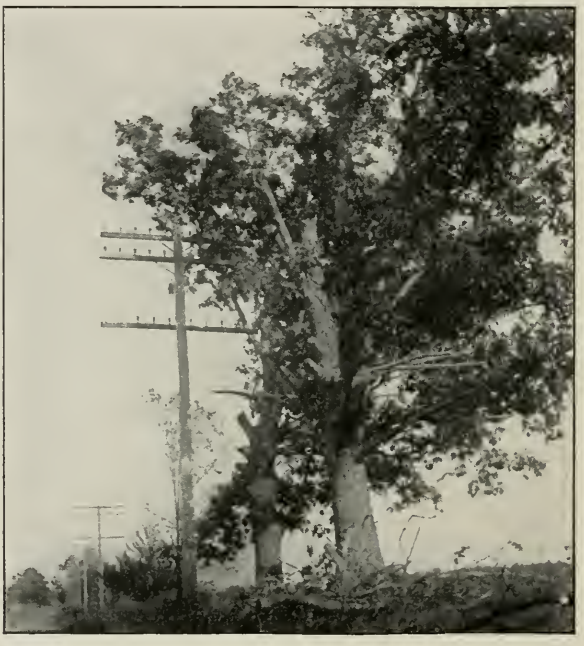

Photo 16

Sacrificed for Telephone Wires.

trees that could defy the storms, and through whose branches the winter winds would sing, "Praise God from Whom all blessings flow!"

Look at the young Maple in Photo 14. I say it is "young," not quite a hundred years old. It stands in the midst of a cultivated field, and as yet there are no breaks in the beautiful top, and if wounds are prevented and roots kept active, there is no reason why decay should attack the center for hundreds of years

Photo 17

All Wires can go Under these Branches.

to come. The top leans a little, but that is on account of the prevailing winds from the south-westerly side.

The Oak should live to be a thousand years of age. We have this fact established in connection with the old estates of Great Britain and the older countries. What was once a very symmetrical White Oak is shown in Photo 16. In order to run a straight line for telephone poles, they slashed right through the side, and then left the wounds open to carry decay to the very center of this fine specimen—the work of Nature for some seventy-five years. "Vandalism!" do you say? If we have no laws by which we can pronounce it "criminal," we should speedily enact such laws as will make it a dastardly "criminal" offense to destroy "property" in such a way.

If there were an occasion for a telegraph or telephone company to run their line on the street seen in Photo 15, the merciless butchers would have no regard for the beauty therein presented.

Suppose one of the "wire" companies took a notion to run the "line" so that it had to pass through the roof of a school house or the end of your residence, and proceeded with axe and saw to demolish the portions of the building that were "in the way," you would pronounce it "destruction of property," would you not? Are not these young Maples in Photo 18 "property?"

Photo 18

Are not Trees Property?

Are the "rights" of this poor man to be trampled under foot because he has no money with which to "law" a great "corporation?" All states should speedily enact laws to protect the tree —as "property."

But there are two sides to all questions. We must not become fanatical and spend our time "ranting." We desire the telephone and the trolley car, and often give "the right of way" to procure them. By what route shall they come? By the "highway," shall they not? for that is where the people live. But is it necessary to construct the line on the road? Yes, it is the most convenient for the trolley line—when you consider that

the people on both sides have to be accommodated. With telephone lines, however, it is different; the poles might just as well be in the field, a hundred feet from fence and trees. While it would take a little extra wire to run to the houses, yet there would probably be a saving to the company, as their wires would not be endangered by falling trees, neither would the current be "grounded" by contact with the sap of the tree. "Feed wires" are commonly run through the tops of trees and occasionally set fire to the latter; and I have seen cases where the linemen have notched the wires where they come in contact with the branch, so that, in the swaying of the top, some branches are actually sawed and burnt off!

In considering this dispute between the people and the trolley and telephone companies, there are many phases that demand attention. First, all kinds of blunders have been committed in the matter of planting trees. (And there is no one particularly

Photo 19

Headed Back in the Nursery.

to blame, as every one in planting did "the best he knew how.") The wrong kinds have been selected and, almost invariably, in towns, have been set in the wrong place. Even when put in an improper place, all trouble might have been avoided by gradually carrying the head of the tree higher up by the removal of the lower branches, so that the bottom branches are fifteen or twenty feet from the ground, and all wires go under the

Photo 20

The Work of Ignorant Tree Men.

branches. See how nicely this could be accomplished in the case shown in Photo 17. But where would there be a chance to do this in the case presented in Photo 18? (These are telephone wires, and the "line" ought to be in the field).

Really, the situation is complicated and often serious. While the men who construct the line are often "ugly" and brutal, and take every advantage to "get through" a tree when they are not being watched, yet, be it said to the credit of some

of the officials of the companies, they do often "try to do right," by going to a great expense in putting in poles sixty feet high or more, to keep away from the trees. ("Give the devil his due.")

"Well," says the practical man, "What's the remedy?" Answer. In rural districts, keep the telephones away from the trees—**out in the field.** In towns, put them underground. Trolley lines, wherever it is practicable, keep **under** the branches.

Photo 21

As Charming in Winter as in Summer.

Where the tree must be cut, this work should be done by an expert, holding credentials from some school, showing that he is capable of performing such work so that there is the least damage possible to the tree.

But the trolley and linemen are not doing all the damage; no, not a tenth part of it!

Look at Photo 19. These are young Norway Maples, about twenty years old and in perfect health. The common mistake that is made has been committed with these. The lower

Photo 22

Cemetery Butchered, Huntingdon, Pa.

branches are about seven feet from the ground. They were "headed back" in the nursery. This should not be done. The "leader" (straight stem) should be preserved, and the lower branches gradually removed until a height of twelve feet is reached. The "heading back" might be done at sixteen feet high, forming the "head" between the points of twelve and sixteen feet. Then all the trimming is practically done; hereafter keep hands off! Nature does not form those beautiful and health-giving tops of shade trees to be cut to pieces to furnish "beer money" for a lot of **Tree Fools.** See what kind of work the "Tree men"—so-called—do, as shown in Photo 20. This is on the same street as No. 19, a little further up. Photo 21 presents what is very common winter scenery in the communities where no professional "Tree man" has cursed the place with his diabolical presence. The endless variety of the tracery of branches of trees in winter is almost as charming as their delightful foliage in summer.

But what a wonderful creature is "**Man!**" Look at the Cemetery, Huntingdon, Pa., Photo 22, and behold what "**Man**" can do! Ten thousand dollars would not repair the damages to that beautiful city of the dead!

Few, if any, greater misfortunes have befallen America, in the last quarter of a century, than the coming of what are known as professional "Tree men" in every city and in many towns. Sometimes his knowledge of tree life is displayed by a few dozen Latin names of trees, that he has found in some nursery catalog, or it may be only in his ability to swing an axe, run a saw, bore holes in trees and fill them with cement and sulphur, (this is one of the "secrets") and make believe that the sap will take up this "preparation" and carry it all over the tree and kill every scale and bug; plastering, also, the trunks with other "preparations" and often killing the trees thereby. But in all their ignorant and nefarious frauds, nothing equals their (what ought to be) "criminal" work of cutting away the tops of trees. The

Photo 23

Mutilated with the Saw.

old State of Pennsylvania has apparently suffered as much as any from these depredations. Harrisburg, the capital, has been almost completely denuded by them. Substantially all the trees on the streets have been ruined, and probably the park trees would have been had not it been for the timely protests of J. Horace McFarland, and his co-workers.

Tens of thousands of what might have been good trees have been ruined in Philadelphia by these tree vandals, resulting in

Photo 24

Their Beauty Is Forever Gone.

a lessening of real-estate values to the extent of millions of dollars. On giving a lecture, recently, in that city before the Civic Club, someone asked, "What is the object of cutting the trees to pieces in this manner?" To which a lady replied that she never heard but one explanation. This, she said, was given in answer to the same question that she propounded to a "Contractor." This contractor hired negroes, Italians and cheap labor on "grading" under the guise of "landscaping." "Well,"

said he, "when the spring opens, our men feel that they ought to be doing something;" so, in order to get "something" for the men to do he called on the good people and "contracted" for what looks like a small sum to "treat the trees." In other words, kill them; and then collect a bill for the ignorant and wicked work.

It is easy to victimize the people because there are so many other blunders that have preceded the "Tree man," or have been committed by him.

Photo 25

The Lower Branches are to Protect the Roots.

Take, for example, the charming row of Hard Maples, seen in Photo 25. Can you imagine anything more thrilling in tree life either in winter or summer? They were set out some fifty years ago. They may have been five years old at the time of planting, so that they are really fifty-five years of age. Following what may be called "the instinct of tree life," they have thrown out their first or lower branches to shield and protect the roots. This is what any single tree will do, when not crowded by other trees. (See Photos 35, 66 and 85.) The spread of the roots is equal to the spread of the top. In other words, the "feeder

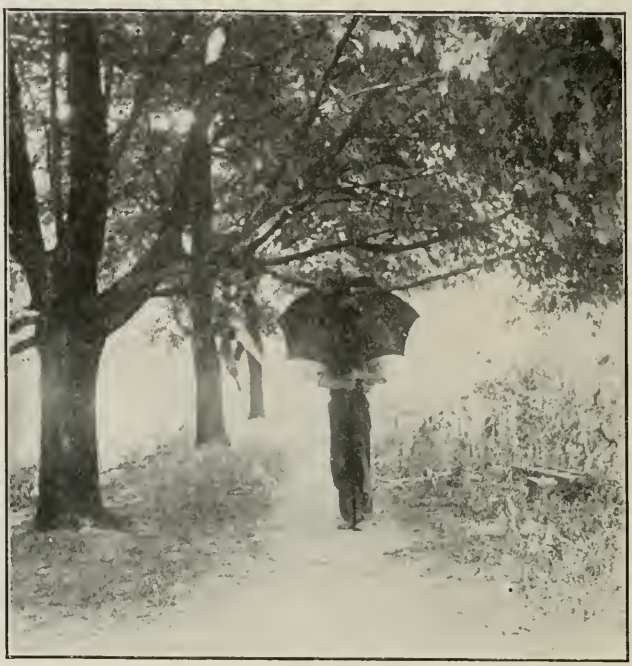

Photo 26

A serious Annoyance to Pedestrians.

roots" are just under the drip of the branches. Now, as to whether the branches on a given tree are to be high up or low down must be determined by the situation that the tree is to occupy. This row seen in Photo 25 is by the highway. On either side the branches extend some thirty feet. On the roadside they reach away toward the middle of the highway and drag on buggy tops and are pronounced a "nuisance." To cut off the two lower tiers means the removal of about one-third of the top. This is a needless waste, i. e., if the trees had been rightly handled. On a street, boulevard, or any kind of highway, we have no choice. We **must** keep up out of the way of interference with traffic. Take again the case in Photo 26. On this street was a row of Maples on each side. The branches were down low, not only on the sidewalks, as you see, interfering with umbrellas, but drooped equally low over the center of the street, so that it was

Photo 27

Too Low for the Street.

a serious annoyance to automobilists, coachmen and teamsters. No condition could have been more favorable to the growth of the tree, because it had perfect root protection. But such obstructions on highways cannot be tolerated. The lower branches must come off. This is where the surgical skill must be applied.

In Photo 27 you have another case of "too-low-down" because these trees are on the street. Those in front of the Kent, Ohio, M. E. Church, seen in Photo 28, were formerly down low,

Photo 28

Young Maples, Kent, Ohio.

Photo 29

Same Trees as in Photo 28 Trained up High.

some six years ago, but the objectionable limbs were taken away, and wounds carefully dressed and the trees are now in perfect health, as can be seen in Photo 29. This is now becoming a model row of young Maples. There is yearly some elongation of the trunk and, in a few seasons, if necessary, a line of tele phone wires can be run under the branches.

Much of the trouble that we are encountering to-day is attributable to errors and oversights of the past. For example, when a town starts, after building houses, most people begin to plan for trees, vines, etc. In many of these young towns the future street lines are quite indefinite. In most cases they have to be guessed at. While the town is small it makes but little difference. However, in those cases where the communities have grown to considerable size, and exact lines and grades have had to be established, it has often seriously interfered with the original tree planting. It was a very common thing to plant the

Photo 30
Rock Maple, Logansport, Pa.

shade trees in the little narrow border between the sidewalk and the street. Where towns have grown into cities and the streets have been covered with asphalt, it has almost invariably proved fatal to the tree. There is but one hope of having good street trees in cities and the larger towns, and that is by every state passing enactments empowering such incorporated communities to put all the trees on the streets under city municipal supervision, just the same as the sidewalks, and then place competent men to care for such trees, and charge the costs to property owners with the taxes, like paving a street, grading or laying a sidewalk. It is useless to leave it to the individual, because where one understands the management of a tree and would attend to it, there are dozens who neither know nor care about the matter.

This subject is thoroughly discussed and illustrated in "A NEW ERA IN TREE GROWING."

When, five years ago, the old "Tree Doctor was published, it devoted seven pages to the condition of trees in Cleveland, Ohio, where trees were in a deplorable condition. The newspapers took the subject up and, in two years, the city petitioned the State legislature for a Forestry Commission which was provided for, and now the trees have improved several hundred per cent.

Up to the time referred to, (five years ago) all writers had assigned the cause of the failure in the "Forest City," mainly to smoke. The "Tree Doctor" pointed out the fact that the main cause was not in smoke but in the soil or rather **no soil** at the root, plus a heavy sod formed on the lawns by putting on a few inches of top-soil, thus shutting out water and air from the roots of the trees. (The central part of Cleveland has nothing but the barrenest sand.)

To satisfy anyone that the smoke is not so detrimental as

Photo 31

The Lower Branches are well out of the Way.

supposed, I call attention to Photo 30. This is at the little station of Logansport, Pa., on the Allegheny Valley Railroad. The tree that is so conspicuous is a Rock Maple. It has grown since the railroad was built. Not only does this tree receive the smoke day after day and year after year, but if you look farther up the track you will notice a large Sycamore, hanging directly over the main track; and around the curve is another, a majestic Elm; and right up into the foliage of these over-hanging branches the heavy locomotives vomit their scalding steam and smothering smoke, and yet there is scarcely any difference in the foliage of these parts of the trees. They are in a state of perfect health because their root conditions are right.

To show how a tree can be carried up and be out of the way of passing vehicles, you can learn a lesson from Photo 31. The

Photo 32

Planted Three Feet inside the Sidewalk.

diameter of the top of this Elm is eighty feet. If it were situated ten feet inside of a road fence, it would hang over the center of a sixty-foot highway. (See also Photo 19.)

The fine, young Maple seen in Photo 32 is located, not on a narrow border between the sidewalk and curbing, but some three feet inside the sidewalk, in the lawn. Its roots ramble

Photo 33

Too Near the Sidewalk.

freely in the soil of the shrubbery bed inside, and pass out under the sidewalk to the gutter, in the street. Should this street be asphalted at any time, it could result in but little injury to the tree.

Photo 33 shows two very thrifty Horse-Chestnuts standing in a row of privet hedge. Though the trees are somewhat young (not over forty years old), yet see how nicely they shade the sidewalk. These should have been planted some three feet

farther within the lawn. It would have been better for the trees; and, as they spread out, would present less contact with the wires. In street planting, I would urge consideration of the propriety of setting the shade trees on the lawn inside the sidewalk, instead of on the ordinary narrow strip, set apart for that

Photo 34

Plenty of Room Means Individuality.

purpose, between the sidewalk and the curbstone. I know the original intention of planting in the narrow strip was good; the intention was to have the tree shade both the sidewalk and the street, but if your trees do not do well there, and you know that they seldom do, you get shade for neither. One tree, properly set and cared for on the lawn, will do more good than a half a dozen in the more unfavorable situation.

On narrow streets, limit the "border" to two feet. On this strip, the telephone and light poles can be set, with room for a

nice little border of sod. Then, striking another line, say six feet from the sidewalk, **on the lawn,** set your shade trees about twenty-five feet apart. If properly set, and of the right size and kind, their branches will soon come together, and extend out over the street, as you see in Photos 33, 59 and 74. There is no guess-work about this, for the camera never lies; it tells you the story faithfully, just as it is.

Photo 35

The Spread of the Roots Equals the Spread of the Top.

We deal now with another phase of the subject. Why are the native woodlands so inexpressibly beautiful? Why does the eye never tire of looking at the rugged, scrambling methods (or rather, no methods) of wild nature? Because every tree, plant, vine, aye! every branch of tree and vine is free to go in the direction where it can be the most benefitted.

Many people "have eyes and see not." About the middle of last June I went from Pittsburg to New York in daylight. From Johnstown, up over the Allegheny Mountains, down around the "Horseshoe Bend," on to Altoona, and down, skirting the

Juniata River, to its confluence with the Susquehanna, near to Harrisburg, it was one perpetual kaleidoscopic presentation of the endless varieties of Nature's verdant grandeur. Behind me sat two ladies who had bought a morning paper and discussed, in the most ardent manner, the merits (?) of a certain scandal. In front was a quartette of good-natured men, enjoying poker and the contents of two whisky bottles. Across the aisle was a corpulent man snoring happily in dreamland; back of him, a fine-looking young lady absorbed in a magazine of the latest fashions; and so on throughout the car. I could not keep my eyes from the transcendent grandeur of mountain, hill and vale. Every time I glanced at my fellow travelers, it was more like a dream. It seemed that it could not be that people pass through such a beautiful world and not see the surrounding grandeur which far excels any picture presented from the pulpit of the glory of the New Jerusalem. Well, I will revert to the trees. In estates where there is an abundance of land, give the trees plenty of room, and let their lower branches rest on the ground. This gives the tree individuality of character. See those lovely specimens in Photos 34 and 35. These, and dozens of others, are at the summer home of Mr. W. B. Dickerman, Mamaroneck, N. Y.

CHAPTER II

THE "CROTCHED" TREE—HOW THE TROUBLE IS PRODUCED—WRONG METHODS OF APPLYING REMEDIES—THE PROPER METHOD—HOW TO CHOOSE TREES FOR PLANTING—WHERE TO FORM THE TOPS—TREE SURGERY—SPECIMENS OF PERFECT HEALING—KINDS OF TREES TO PLANT ON STREETS—ROOTS—THEIR ACTION—CARE OF ROOTS—DESTRUCTION OF ROOTS BY INCOMPETENT "LANDSCAPERS."

Photo 36 presents some very healthy Horse-Chestnut trees. Do you see anything particularly wrong with them? Probably not. By the way, the Horse-Chestnut makes a very fine shade tree, but is subject to the failings of most Elms, "Soft Maples," Red Oaks and quite a few other trees. The trouble is, they are apt to be "crotchy." Thousands of beautiful Elm trees yearly go to pieces from the force of the wind at these weak points. Photo 37 shows the remains of an Elm which, a few years ago, would have been considered by some worth thousands of dollars. Over one quarter of the tree was rent off in a gale, on the side where the gentleman is inspecting it. Another huge branch, higher up to the left, came off in the same storm, while the remainder is split clear to the ground in the center. How willingly we would "lock the door after the horse is stolen!" Hundreds of thousands of the finest trees in the country are jeopardized annually from this weakness. Of course the larger the tree, the greater the leverage of the wind on its branches, and those that are torn to pieces in this way are usually the most valuable.

If you turn back to the Photo marked "Summer," you will be looking at the front of Mr. Henry M. Flagler's residence, Orienta Point, Mamaroneck, N. Y. You will notice that a little to the left of the center of the house, and some fifty

Photo 36

Horse-Chestnuts are Apt to be Crotchy.

feet out from the building, there is a beautiful Elm towering up and spreading like a huge umbrella. This tree was split, however, in three places; in one of them to the ground. It was my good pleasure to be permitted to put twenty of our young students to work there, fixing up all the trees on the estate. So thorough was the work on the Elm referred to that a wind would have to blow it down before it could split again; and so pleased was Mr. Warren, the superintendent, that he remarked: "I consider your work in saving this Elm alone worth all that the bill amounts to on the whole estate."

In my lecture work, in writing, and on all occasions I lay more stress on the troubles arising from the "forked" or "crotched" condition of trees than on all others, because it is safe to say that seventy-five per cent. of orchard and shade trees that have been planted are weakened from this source. "What is the remedy?" Those applied are sometimes as bad as the

Photo 37
Ruined by Windstorms.

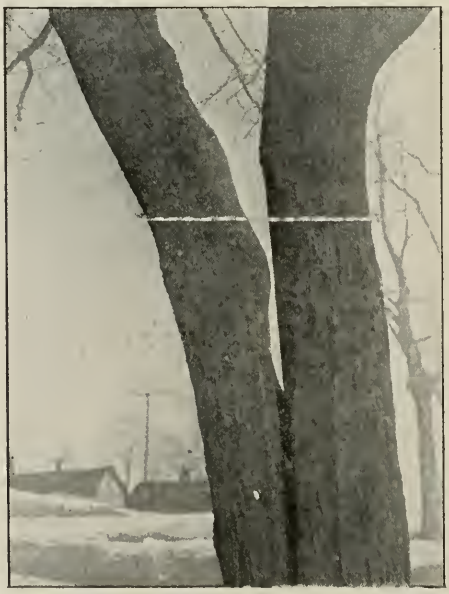

Photo 38
If Placed Properly, Bolts Strengthen.

disease. Chains are often put around the branches, resulting in "girdling." Sometimes iron clamps are used, with the same result. Whatever method is used it is safe to say the purpose of the person was all right. Undoubtedly he did the best he knew how. If I can give some clearer ideas of the best methods it ought to accomplish much good.

The bolt should be used in preference to the clamps. "But where shall I place the bolt?" Look at Photo 38. Suppose you put the bolt where the line indicates. What is the result? Sometime, it may be soon or it may not be for years, a strong wind will place its shoulder on one or the other of the high branches, and will make a fulcrum of the head of the bolt; then C-R-A-C-K! and away goes one-half of the tree! However, a bolt can be put at the point to draw it firmly together, after the decayed matter has been removed and the proper filling put in place.

The same should be done in the case of Photo 39. But after

Photo 39
A Bolt is Needed.

these points are secured, place a bolt higher up, as in Photo 40; higher up still where the right hand is pointing would be preferable. But the best method of all is what we have recently introduced, the hook-bolt and chain. This is less expensive and more effectual.

Photo 40

Place Bolt Higher Up.

All who have trees with the tendency to splitting will not only save expense by heading off the danger before breaking, but **save the tree itself.** Alas! how many have mourned when an old monarch and friend is laid low and **gone forever!**

Photo 42 is a young Cherry tree; one of an orchard of one hundred trees, planted some ten years ago. Like all the others, it was planted just as it came from the nursery. This, you see,

was "headed back" not three feet from the ground. Apple, Pear, Peach, Plum trees—all come out of the nurseries "cut back" three or four feet from the ground. This is decidedly

Photo 41

The Hook-bolt and Chain.

wrong. The only reason that the nursery men assign for it is, "People will not buy fish-poles and whip-stalks; they call for a tree; that is, a stalk with branches." The nurserymen say, "We know that you are right, but we grow the stock for sale." You

Photo 42

Heading Back is Wrong.

see the people are under a great delusion; their education is defective. Good people, you should learn that in purchasing nursery stock it is cheaper for you to go out and cut "brush wood" in the fence corners than it is to pay twenty-five cents a handful —extra—to have it on the young tree when it is brought to you. If you will call for a straight "leader," a two-year old plant, standing five or six feet high, then you can make a decent tree out of it, high or low—just as you desire.

Look at Photo 43. This is another young Cherry tree. I went into the nursery and picked out this and some others for a friend. The lower tier of branches was removed every year until it was of the desired height. There is not a "crotch" in it,

Photo 43

Having a Straight Leader.

or in any of its companions. There need not be in any tree though it may have a tendency to that weakness. As a young tree grows remove with the jack-knife all the branches that show signs of being "forked," and this will force out the lateral twigs and form them into strong branches.

As to the height to form the "head," that must be left to your judgment. This, shown in Photo 43, is by a driveway and hence is carried up fully seven feet from the ground. The ultimate outcome of the "crotched tree" is what you see in Photo 44.

This was a fine old Cherry tree—split at the point where it was formerly "headed back."

TREE SURGERY.

There is one law that is said to hold good in animal life, namely, "the life of any animal is capable of being **five** times the period of its maturity." For example, a horse matures its size at five, and may be a fairly good horse at twenty-five years. A neighbor of mine has one thirty years old and he drives to town with it. A man matures his body, substantially, at twenty, and often lives to be an hundred years old. Sometime since, I photographed a Mrs. Freeman, at Red Bank, Pa., at the age of one hundred and twelve years. She had "made garden" that season, and also attended to "herding" the cow. She was quite bright, and could accurately relate all the incidents of the early days of that region.

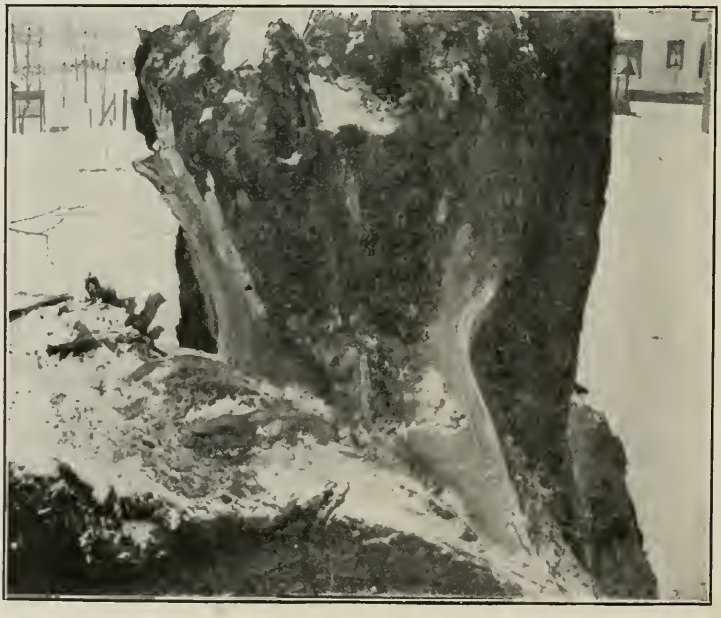

Photo 44
Split as a Result of Heading Back.

The law in plant and tree life is strongly analogous to the animal kingdom. An Apple tree makes a good size at forty years, and should be "hale and hearty" at two hundred years.

Some scientists speak of the "heart" of a sound tree as being "dead;" indeed some have gone so far as to call all the tree "dead" except the outer parts. It seems to me, however, a mistake to use the word "dead" to designate those stationary parts. How can we apply the term "dead" to the center of a tree whose millions of cells are constantly engaged in conveying "live sap" to the upper extremities to be converted into "tree blood?" Gentlemen, can't you "coin" a better word? "Death" is always associated with decay. In Photos 45 and 46 you surely have "dead" centers. They have decayed and disappeared. Photo 45 is a very peculiarly interesting case. It is a Norway Maple, on the grounds of Mr. Robt. Pitcairn, Ellsworth Ave., Pittsburg, Pa. All the center was completely decayed and had to be taken out; nothing but

Photo 45

Norway Maple, Robert Pitcairn grounds, Pittsburg, Pa.

a shell left with one little strip of live wood, on one side, from which the new work of healing could begin. Photo 46 is an old Cherry tree of fine quality. Nothing but a shell left. This is at Mr. Hollister's, Quaker Ridge, Mamaroneck, N. Y. Within is seen beautiful little Martha Hollister, granddaughter of Mr.

Photo 46
Mammoth Cherry Tree, Mamaroneck, N. Y.

and Mrs. W. B. Dickerman. This tree was also filled and will heal completely over.

"Tree Surgery" is a delicate and complicated science, about as much so as that of the veterinary or human surgeon. There is absolutely no "rule" for doing the work. There are never two cases alike; hence we have found it necessary to "drill" young men who—otherwise—are men of skill. It is with pleasure and some amount of honest pride that we can call attention to our intelligent young men, a group of whom is shown in the frontispiece.

First these young men have to understand the vital princi-

ples of tree-life. The next thing is for them to fully comprehend the grave fact that **Life** and **Death** are eternally at war with each other, and that the life energies cannot perform the work of healing while any of the death elements are left to antagonize the living forces. Hence all the dead matter must be removed. This, at times, is arduous and tedious work, but the average

Photo 47
Ready for Filling.

young man feels some degree of pride when he can complete a piece of work ready for "filling," as you see it in Photo 47. I notice from the papers and magazines that there are a host of "Tree Doctors" springing up over the land. These are probably the most reputable portion of the old "Tree men" who, formerly, murdered millions of trees. However, we should encourage a "conversion" wherever a man "turneth away from his wickedness and doeth that which is lawful and right." I regret to say, however, that so far I have not seen a single piece of their cement

Photo 48
The work Completed.

work that has been done in such a way that no moisture can possibly get behind the cement. If water is allowed to get in, it would be ten to one better not to have "filled;" for the decay is intensified tenfold by having the moisture shut in and the air excluded. Photo 48 is the same subject as 47. No two teams of horses could pull the material out. This tree is on Mr. Wm. Rockefeller's estate, Tarrytown, N. Y. The trouble was caused by a large branch blowing off. How very important it is to "prevent" those "crotched" branches from splitting and causing such mischief and expense. Remember the "stitch in time."

The tree, shown in four consecutive stages, is situated in the rear of the school house, Sewickley, Pa. It was ordered repaired by the borough School Board, and cost about sixty dollars. It was described a year ago in print as "The Maple and the Man." It may live for hundreds of years. It took some three tons of material to fill the large cavity. Photo 50 shows what a beautiful specimen it is.

Photo 49

The Maple in its Diseased State.

THE MAPLE AND THE MAN.

The Maple.

Lo! here I've stood, in silence deep,
Through winter's storm and summer's heat;
The school house bell and children's cheers
I've heard for nearly fifty years.
I've called on teachers, passers-by,
But none, it seemed, could hear my cry;

I've hailed the children, youth and age,
The man of "rank," the priest, the sage;
I've shown my wounds to great and small,
But all declined to heed my call;
Or, peradventure, such may be,
They did not comprehend a tree!
But think, because I'm free from strife,
I'm not endowed with force or life,
And need no care or human thought,
'Mid winter's blasts and days so hot!

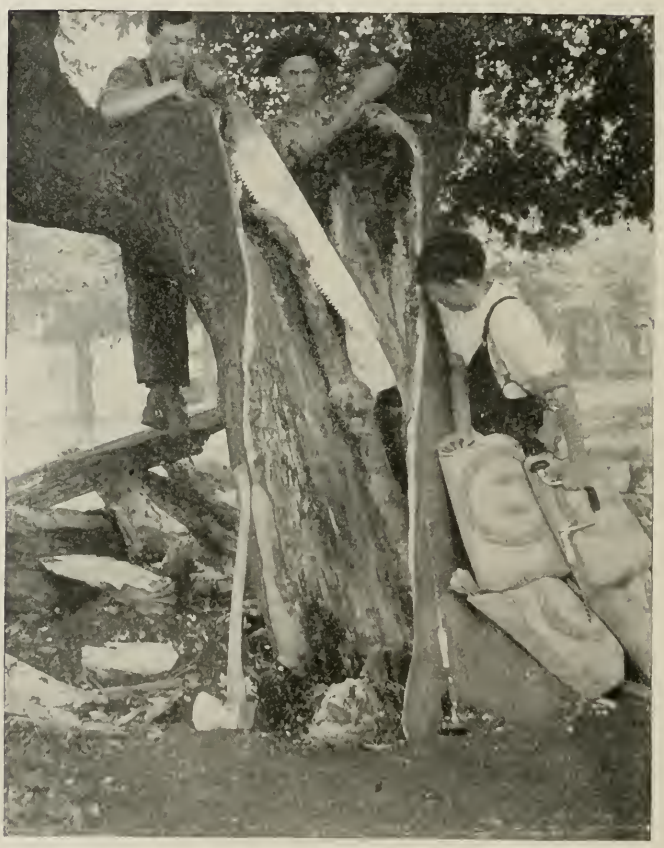

Photo 50
The Maple with Decayed Center partly Removed.

I welcome thee! Oh, "Man of Trees,"
Thy fame shall spread upon the breeze:
When millionaires shall be forgot,
And all the honors they have sought
Have passed into oblivion's gloom,
And fortunes met their fitful doom,
The noble trees of forest fair,
The apple tree, the plum, the pear,
The copse and grove of every clime,
Shall raise their praise to Him—Divine—

Photo 51
The Maple Filled and Finished.

Who's heard our cries in Heaven above
And manifests a father-love,
And sends redemption full and free
For every plant, and shrub, and tree.

The Man.

Thy prayers are heard, oh beauteous tree!
And soon will spread from sea to sea;
Though starless was thy night of gloom,
Thy light shall shine as bright as noon.
Thou pleadest well for all thy kind;
Thy prayers are heard by highest mind.
Be calm and do not think us "rough"
As we remove this odious stuff;
For life and death at war will be,
Alike in man or beast or tree;
These hideous wounds! this rotten wood,
Is "home" for bugs and makes them food.
"Ouch!" did you say? well, do not flinch,
We move this virus inch by inch;
With mallet, chisel, drill and saw,
We clear the way for Nature's law
To reconstruct and build it strong—
A body that will last you long—
And teach the world what all should know
Trees must have care or cannot grow;
They cannot heal while DEATH is hid
In body, root, or branch, or twig.
So now stand forth and shout thy call,
And show to youth and age and all
The "law of life" is much the same
In beast or bird, or tree or man.
With careful process, day by day,
We've taken all dead parts away,
Just as a dental surgeon—wise—
We clean the tree before your eyes.
We use no "liquid," "wash" nor "soap,"
Nor any kind of secret "dope,"

Photo 52
The Maple after Treatment, with some 300 School Children.

But clean the tree of "scale" and rot,
And give the aid it long has sought;
Yes, "sought" by mute appeal to all,
Although they did not hear the call.
"Tree life" but few could understand;
But, lo! they wake throughout the land,
Aye! with love and zeal, unique, sublime!
Inquiries come from every clime!
From South, beneath the torrid heat,
From frozen North, so cold, so bleak!

Around the world, upon the breeze,
Goes forth the call to "save our trees!"
This call at once we all should heed,
And give the trees the care they need;
Not "medicines" from "quacks" and "fakes,"
But commonsense is all it takes,
Combined with knowledge of a tree,
With "ears to hear" and "eyes to see"
When troubles rise and where it leads,
And head them off by careful deeds.

The Maple.

Praise Him, ye morning stars of light!
And all ye sparkling hosts of night!
Praise Him, ye glorious, shining sun!
Praise Him, ye moon, each course ye run!
Praise Him, ye winds and silent dews!
Praise Him, ye "sparks," that "flash the news!"
Praise Him, ye frost and spotless snow!
Praise Him, Oh, man! where'er you go!
Now sing, ye children, one and all,
For God, at last, has heard my call;
No longer, now, I feel forlorn,
But ready am to face the storm!
Will break the winter's furious blast
While you recite or sing in class;
Will give you shade and keep you cool,
In "recess" of the summer's school:
One hundred years I'll faithful be,
To tell "The Story of the Tree,"
Whose life the "Board" has tried to save,
And keep me from a youthful grave.
Go forth, ye children, shout and sing,
And send your praise upon the wing
Of winds, or on the rays of dawn;
And e'er the shades of night have drawn
Let praise arise to Him—Divine—
While earth revolves and stars shall shine.

Photo 53 presents a case which would have been quite a surprise to most people. It is a good-sized Hickory tree, on the estate of Mr. Wm. Rockefeller, Tarrytown, N. Y. The top of the tree showed signs of failing. To a person not acquainted with "tree troubles" there was no visible cause for the dying condition. It took but little time, however, to locate the cause of "twig failure." It was found at the base of the trunk. Dead bark on one side was the first "pointer." Following this "lead" the discovery was what you can see for yourself in the photograph: the whole center of the tree dead and had to be removed.

One of the things of interest in this work is the amazing numbers of "live critters" that are found in these portions of a diseased tree. It sounds almost paradoxical to say that a "dead" trunk is "alive" with borers, grubs, beetles, ants and all kinds of creeping things. Yet a moment's reflection satisfies one that this is the natural order of affairs. Every living thing feeds on

Photo 53

Hickory Tree, Wm. Rockefeller estate, Tarrytown, N. Y.

death. There is a most beautiful economy in all the arrangement of Nature. As soon as any one creature succumbs to death, there are other creatures to prey upon it and hasten its dissolution into the primary elements, so that it can be worked over and put into some other form. To our senses there is a strong aversion to the decay that follows death. We may pity a diseased tree, but we certainly cannot admire it. But how

Photo 54

Cross Section of an Elm.

doubly interesting it is when we realize that we can remove the decay from an old forest friend, heal its wounds and restore it to health and the charm of its youth!

The Chestnut in Photo 55 was filled three years ago, as was also the Red Oak, shown in Photo 56. See how nicely the new lines are forming. There are a few cracks in the "filling," and these cannot be avoided, as the swaying of the tree in the wind will make some "elbows" in the most convenient places. These cracks should be frequently painted to prevent water entering and getting behind the cement. The thick paint found in the

bottom of old paint buckets is just the thing to work into the crevices.

Photo 54 teaches a wonderful lesson. How nobly nature

Photo 55
New Lines Forming around Filling.

had struggled to repair the damage done to this tree! Disease had attacked and eaten away its whole center. This, as you will see, is a cross section of an Elm tree. See how eagerly Nature—unaided—has struggled, arching and curving, to straighten the

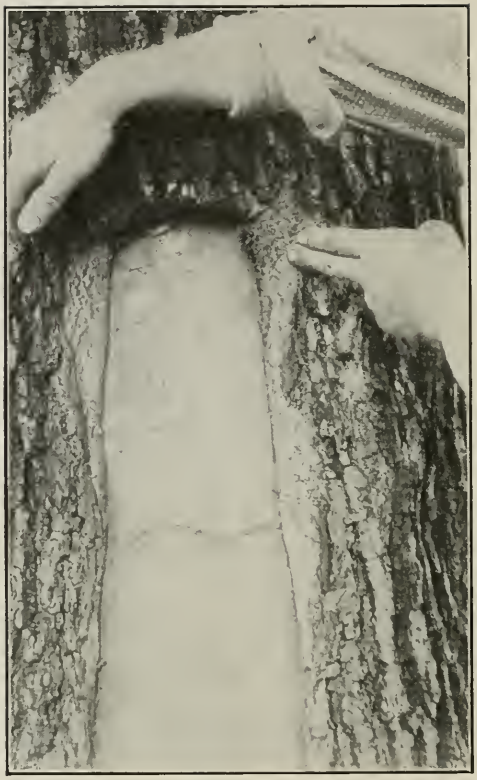

Photo 56

Keep Cracks of Filling well Painted.

weakened point! To a sympathetic person this is pathetic. It started to make repairs at the point where you see two bits of paper tacked on, and, by actual measurement with the tape, it has built enough new growth to have covered the wounded parts more than three times. Is not this, though mute, a pathetic appeal for "help?" Suppose, some twenty years ago, the decayed matter had been removed and a filling properly put in, it would have progressed in the "healing art," as you see in the several cases herein shown, and notably in that presented in Photo 57, and would have closed, as seen in Photo 58.

Good people, I would not advise you to spend money on all

old trees, but there may be some, situated where they are of considerable value, or connected with some tender associations of earlier days, that might justify the expense, though sometimes a bill may run high on a work of this kind. Suppose, for example, that the expense on a certain tree would be one hundred dollars, and the work—skillfully done—would restore the beauty of the tree and prolong its life for hundreds of years? Then, financially considered, the investment would be a good one. Two years ago, J. Horace McFarland, President of the American Civic Societies, wrote me that Prof. Sargent, of the Arboretum, of Boston, had condemned "cement in trees." When in Boston, I went into the parks and found that the professor was justified

Photo 57

When Properly Filled, all Trees will Heal.

Photo 58
This Wound has nearly Closed.

Photo 59
A few Years will Complete the Arch.

in making the condemnation (for I suppose he formed his opinion from what he saw.) Any boy of ten could have done the work as well. The professor, however, will undoubtedly be pleased to learn that "cement work" is O. K. when the work is properly done, as proven by the camera, in the photos herein presented.

In Photo 59 are presented four beautiful specimens of the Rock Maple. Three years ago some ten wagon loads of dead wood

Photo 60

Bridge grafting a large wound after removing a branch. Young growing twigs with wedge-shaped ends are inserted in spring, and waxed, as in ordinary grafting. They will eventually unite.

were taken out of the tops. Two of them were badly "crotched," one of them being split clear to the ground. They were "fixed up generally" and to-day the property is at least a thousand dollars more valuable than it would have been without the service.

As to whether "tree doctoring" pays, it depends entirely on whether the work is rightly done. I regret that many things go into print that are misleading. I reproduce here two photos from "The Window Gardener's Complete Manual" for January, 1907. Both photos have under them the exact reading that appeared in the Magazine. Photo 60, as you see, explains "bridge grafting." This is an ancient practice, hundreds of years old.

It is used to "bridge over" the cambium, where a young tree has been "girdled" by rabbits, or from any other cause. These scions, as shown in the photo, will grow, if the work is properly executed. But what of that? It is a needless expense; for if the wound be properly dressed and "capped" and kept painted to keep out moisture, that is all that is required. Though a needless expense, in this application, it is a practice worth knowing so that it can be used in cases of "girdling," etc. Photo 61 is, to use a slang phrase, a "corker." It shows either the utter lack of knowledge of tree life on the part of the writer, or a woeful absence of observation. Drive a chisel through the bark of a tree and pry it up, and it would be possible for the bark to reunite, if it were bound back tight and all air excluded. The bark might be perfectly connected above and below but if the least air were admitted the bark would dry up and a new growth form under it. If Mr. Watson, the writer of said article, will perform

Photo 61

Covering a big wound with new bark. Instead of waiting years for the bark to close over; strips are cleft grafted.

Photo 62

Hard Maple with large, brushy Top.

a piece of bark grafting, and put it in charge of a committee appointed by a Florist's Club or Horticultural Society, and if, at the end of six months there can be any life found in the grafted bark we will say with Bill Nye: "The 'coming man' has arived," and we will give due credit to Doubleday, Page & Co. for introducing "Elijah, the Third!"

WHAT KIND OF TREES FOR STREETS?

Not long ago I read a report of a superintendent of parks in which he recommended thirty-seven varieties of trees for street planting; all of them had some merits.

I aim to benefit the American people by pointing out the

Photo 63, A young Giant.

cause of the premature death of millions of trees and to suggest the simplest methods of rectifying the mistakes.

To get an answer to the question "What kind of trees for streets?" we should first settle in our minds what is the purpose of street planting. Ask the first man you meet, and he probably will say "shade;" then ask the next, and inquire of all the

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Those interested in shading the streets of cities should read "A NEW ERA IN TREE GROWING." This shows how to shade the streets of New York with perfectly healthy trees. I spent a week in that city examining the conditions leading to the failures, and have given the results of my investigations. To save going over the same ground in the present work, I refer all interested in good trees on city streets of "A NEW ERA IN TREE GROWING."

women and children, and the probabilities are, all will give you the answer, "s-h-a-d-e!" Of course there are other considerations with some people; but, for the street, "shade" is the first consideration.

With all the chances of observation that I have had, I am convinced that there is no tree so well adapted for narrow or medium width streets as the Norway Maple. It is commonly supposed that it "heads" low down. It does, but it is not necessary that it should. I have seen fine specimens with a bole (trunk) of twenty feet before there was a single branch. Don't be deceived when you purchase the trees. The Sycamore Maple strongly resembles the Norway, but is "crotchy" and the wood is brittle. The Norway, however, has tough wood and strong lateral arms which seldom ever break. It has a very heavy, dark green foliage, and is as near "bug-proof" as any. See the fine specimen back of the telephone pole in Photo 74.

Photo 64

A "Hard" or "Sugar" Maple.

Next to the Norway Maple, I would suggest the far-famed American Elm, particularly for wider streets. Saying nothing of the possibility of age and size of this majestic tree, is there anything more desirable than the charm and grace of what is seen in Photo 17? The Elm will adapt itself to a greater variety of soils than any tree that I am acquainted with. It will thrive in sand, gravel or clay, provided it can obtain sufficient moisture.

"What about the Hard Maples?" Charming, glorious! if they can be properly treated. Maples generally are spoken of as "Hard" or "Soft" Maples. In speaking of the different varieties of "Hard" Maples, I will omit the names and let the camera show some difference in type. The large, brushy-top tree in Photo 62 is a "Hard" or "Sugar" Maple; so is that in 63, and also in 64. The character of each one is quite marked, but the most desirable type is that in 63. Look at its firm, lateral arms. A veritable young giant, standing there ready to grapple with the fiercest gales!

Next in order I would suggest the Sycamore. The American variety is hardy, adapts itself to almost any kind of soil, is attacked but little by insect pests, and is one of the strongest built trees we have. It seldom ever has a "crotch," but produces strong lateral arms, attached to the bole with a very firm "shoulder." The European variety ("Plane Tree") is, perhaps, a handsomer tree than the native variety. The "Pin Oak" has recently gained great notoriety. It is a magnificent tree and grows to a large size. If you introduce these into your community, see that the local "Tree man" is banished or imprisoned before you plant them, or he will "whack" the tops off, destroying the "leader" and ruin the tree as he did in Photo 65.

The "White Oak!" How majestic! Don't plant the Lindens and "Soft" Maples on streets, they are too frail; nor the drooping Linden ("Lime Tree"). How beautiful they are! Just the thing on a lawn or in a park, with branches drooping quite on the ground. See Photos 34 and 88. These are very "crotchy," and I never saw a large one (in this country) that had not been injured by the wind.

"Carolina Poplar?" Oh, don't ever mention it unless it be to plant around your barnyard!

I have mentioned a few of the very best trees suitable for

street planting. Add others, if you desire, such as the Horse-Chestnut; or better still the American "Buckeye." They look very much alike, but the leaf of the Buckeye is smaller, and the wood tough, and the tree strongly built. The Liquid Amber, or Sweet Gum tree is a very good one. The Ash is pretty but not

Photo 65

With Top Gone, the Tree is Destroyed.

desirable for the street. I often see Mulberries, June-berries, and the like planted on the street. It is no place for them.

"What distance apart should street trees be planted?" That depends on the kind of tree, width of the street, character of the soil, etc. Never closer than twenty-five feet. If the street be wide and the soil good, plant from thirty to sixty feet apart. Does that astonish you? Well, just take a look at the "big Elms" in New Haven and Hartford, Conn., and at Framingham, Mass., and scores of other New England towns. Those early set-

Photo 66

Horse-Chestnut, W. B. Dickerman estate, Mamaroneck, N. Y.

tlers knew the character of trees, and "spaced" them correctly to bring the best results. I often see ten trees where there should be only one, and this is particularly true in lawns and private grounds. It is all right to plant thick if you desire to "group" or "clump" them, with a view to producing woodland effects, or shutting off unsightly objects, etc.

But look at the Horse-Chestnut, in Photo 66. This is on the grounds of Mr. and Mrs. W. B. Dickerman, Mamaroneck, N. Y. These wise people have preserved about all the trees on the spacious lawn in this charming condition. "Johnny Garey," who is seen with his old friend "Deak," takes great pride in preserving those beautiful specimens in accord with the wishes of the proprietors.

To avoid too thick planting, you must use your own judgment. Commonly, in purchasing a bill of plants, the person takes the advice of the man with the big book of cuts; and he, in order to sell, proceeds to tell all the lies in his note-bok, plus all

that are known to the hustling tree agent profession. Can you blame him? As the Quaker said, he is "looking after his end of the bargain; but thee shouldst look after thine."

When the trees are allowed to grow with the branches resting on the ground, it produces conditions for the perfect health of the tree. It destroys all sod and other vegetable growth, and millions of "feeders" are formed near the surface. Look at Photo 67. It has the appearance of a lot of little bits of sticks lying on the ground, but these are roots; they have grown there because the moisture is formed there—on hot days—from condensation. The air, also, freely circulates among them, keeping the roots in a state of good health. It is late spring and the buds are unfolding, and you can see where the tips of the branches hang; the sod is formed out beyond that. There is nothing more interesting in the whole study of tree life than the conduct of the roots.

Photo 67

A Condition for perfect Health.

In Photo 68 you have the view of a very fine Hickory tree. There is something very commanding and expressive in the appearance of this individual, and it is more so when you approach it and find that, to all appearances, it is growing right out of a huge rock. Photo 69 shows you the base of the tree. A tree has a something almost analogous to consciousness. The nut

Photo 68

Hickory Tree growing on Huge Rock.

dropped down in the crevice germinated, and the little "feeders" reached out after the tiny drops of water that were condensed by the rock on hot days. Then they hid themselves under the decaying leaves and dust. Silently they crept down, down, till they got out among the fragments of the rocks. Now, if you draw on your imagination, you can almost hear the little twigs shout, "All right below?" To which the answer is given by the "working roots," "O. K. below; we will mine for raw material here and send it up, and you mind your knitting up there, manu-

facture the cambium and hustle it down for our support." Thus the two extremities have co-operated and constructed an object of utility and beauty.

One of the commonest mistakes is made by being too much in a hurry, and insisting on having big trees planted. Now don't understand me as saying that large trees cannot be moved.

Photo 69

Base of Hickory Tree.

for they can, and the work can be done with perfect success, provided you save the "feeding roots;" but to do this often involves big expense, more than most people are willing to pay; but there are any number of "Tree men" hungry for a job who will undertake such work at figures which are utterly impossible and do it right. They "slight the work to save themselves." This is wrong all around. I see hundreds of trees every summer standing dead that have been moved and "guaranteed" to live.

If you will thrust a spade down into the ground, just under the tips of the branches, you will find large quantities of fibrous

Photo 70
Usual Method of Transplanting.

Photo 71
Dead Branches Show the Result.

roots. "Are these the feeders?" No, but the little feeding "hair roots" are situated on these. They are usually so small that it takes a microscope to see them. All nourishment must be gathered by these faithful little "workers." These, as all know who know anything about tree life, are scattered all over the ends of the roots. To insure success, enough of the small rootlets must be procured to furnish the "raw material" for the tree or it will languish, dry up and die. Suppose you were going to move one of Mr. French's Peach trees, seen in Photo 92. It could be done, but how do you proceed to figure? Well, let's see; the diameter of the top is about sixteen feet. That is practically what the spread of the roots is, (they really run out much farther.) Now to make sure of perfect success, you would throw

Photo 72

The Bark finally Peels off.

a line around the trunk of the tree, measure off eight feet and draw a circle sixteen feet in diameter, work under the roots, lift and move the tree into a hole, say eighteen feet in diameter. Do the "Tree men" proceed in that way? Not many of them. If they dig at a distance of three feet from the tree, giving a six-foot root spread, they think they are doing a great thing. But they thus destroy at least ninety per cent. of the "feeders."

Photo 73

Use Small Trees for Planting.

Photo 70 gives a view of how the work is usually done. Nine-tenths of the large trees that I have seen transplanted are practically grubbed out. A couple years later you can pull them out of the ground in a condition much as the one the group are inspecting. When the "feeders" are left behind, what part of the tree is the first to suffer? The central portion. The chunk of a branch lying on the stand, in Photo 71, shows how it becomes affected. Dead twigs over and through the top tell the story of its sad fate. A tree thus abused, with only a tenth to a fiftieth enough moisture supplied, cannot stand the hot days of July and

August, and the bark dries up on the side toward the hottest sun, and finally peels off, as you see in Photo 72. But look how the poor creature has worked and plodded, all alone, with no one to pity but the eyes of the Infinite, to try to live! Oh, marvelous something that we call "Life!" So tenacious of life are

Photo 74

The Norway Maple Is as near Bug-Proof as any Tree.

these wonderful creatures that they will, sometimes, go plodding along for years and, finally, heal over a mass of dried up, dead wood; but the result is a hollow tree, likely to blow over on your house some stormy night.

Unless it be an urgent need, I would not use a big tree at all, for planting or transplanting, because in planting the small one,

(say about the size of a broom handle,) you are almost sure of success. Photo 73 gives a glimpse of two rows of young "Rock Maples," set six years ago. Not one failed on the whole street. This will become, in time, equally as beautiful as the single row shown in Photo 25. See the heavy-foliage Norway Maple, (behind the pole) in Photo 74. This has been planted about forty years, and the diameter of the top is over fifty feet.

Anyone who has passed the meridian of life is conscious how rapidly the years go by. There are but few things that are more pleasurable and profitable than the intelligent, judicious planting of trees for posterity; but when you plant, use the **small tree,** and the result will be **a perfect one.**

Did you ever notice the different forms of Apple trees? The lessons they give are very suggestive and instructive. Take, for example, the old-fashioned, long "Sheep-Nose" apple; the form of the tree is strikingly like the fruit, viz.: elongated and pointed. As the opposite of that, examine a Rhode Island

Photo 75

Roots of a Rock Maple.

Greening apple, and the tree from whence it came, and you will learn that the tree is somewhat flat and spreading; in other words, it is about the form of the fruit.

You are acquainted with the "tap roots" of Hickories, Chestnuts, Oaks and some other trees: the long, leading roots that have a tendency to go straight down, corresponding to tops which, when "crowded," will run to great heights. Contrasted with that type, take the roots of the Rock Maple, seen in Photo 75; how interesting! This is the base of the charming Maple seen in Photo 14. See how firmly it grasps the soil. Contrasted with the former, see the difference in the root form of Photo 76. This is a Pin Oak, and the division of the roots into many small ones is in harmony with the multitude of small branches of the top, and also of the fine-cut leaf.

Oh, wonderful creation! But, oh, pitiable man! so unwise, so blind to his own interests as to learn so few of the infinite

Photo 76

Roots of a Pin Oak.

Photo 77

Roots of Trees Correspond in Form to Tops.

number of lessons which are daily spread before his self-closed eyes.

Turn to Photo 77. This shows an excavation in a sand-bank. Above is standing an Apple tree about twenty-five years old. This is very light, porous soil, and there are strong roots found here, fourteen feet from the surface, and the tips of these roots are probably ten feet or more further down. Probably if the soil were sufficiently deep, and thoroughly porous, the roots would plunge down or spread out to almost the exact form and dimensions of the top. In Sandusky, O., I saw where a ditch was being dug close by some Elm trees. It was loose soil, about one-half fragmentary lime-stone rocks. This soil was full of Elm roots, and when the solid rock was reached, five feet from the surface, there was a perfect, matted, net-work of roots,* completely covering the bed rock.

See Page 59, "PRIMER ON TREES AND BIRDS."

Photo 78
With Roots near the Surface, Windstorms play Havoc.

While an Elm will plunge deep into the soil, as just described, yet in swampy lands it will keep its roots just below the surface, and so the wind will topple it over, as you see in Photo 78. In swampy lands at a certain depth the water stands all the year round. As the roots reach this depth the voice of the tree cries out: "Hold on, boys; don't venture farther down, or you'll drown, sure as fate!" So they do the next best thing; they swing off laterally but, having no depth of soil, the tree becomes a prey to the howling winds.

In this "prosperous" epoch, thousands of people have "made money," and with the purest desires and most laudable purposes have gone out into the rural districts and purchased woodland property, with a view to living among the trees. The first consideration is the house; the architect produces the plans which are finally accepted. Now comes the "Landscape Architect;" he is consulted and the grounds put in his charge. It is with

pleasure that I testify that America has some of the finest landscape gardeners in the world, but there are others whose qualifications consist in a common education, an office in some "skyscraper," some clerks to draw curved and straight lines, and make pretty pictures on paper. With this superficial and artificial education they sally forth, procure contracts, and proceed with "filling," any way from one to ten feet deep on the roots of trees! They complete their job, receive their pay, secure a "testimonial," hunt up the next honest person and repeat the same destruction of property. At all those places where they have performed the art of "filling in" around trees, a year later they begin to look sickly; and but few people seem to comprehend that the roots are dying, smothering to death! To save a beautiful White Oak, in Pittsburg, I had to order the "filling" removed twelve feet from the tree (twenty-four feet diameter). The roots had been buried six feet deep! Think of that, as the work of a "landscape architect!"

Large trees can be raised or lowered, not only without injury, but often proving highly beneficial, provided the roots are preserved and fed.

CHAPTER III

RAIN MAKING—HOW PLANTS ARE FED—PEAR BLIGHT AND OTHER BLIGHTS—BLIGHTS THE RESULT OF PREVIOUS INJURIES—PEACH YELLOWS AND OTHER TROUBLES—PREVENTION NOT CURE PRUNING THE PEACH—THE GRAPE VINE—DESTRUCTION OF THOUSANDS OF TONS OF GRAPES ANNUALLY—IMPROPER AND PROPER METHODS OF PRUNING — THE "RESERVOIR" SYSTEM FOR SUPPLYING TREES WITH WATER—THE RATHBONE ELM—WONDERS OF CREATIVE FORESTS.

RAIN MAKING.

I predict not only "a New Era in Tree Growing" but a New Epoch in Agriculture. As discussed toward the end of this work, the people, probably fifty per cent. of them, must "go back to the land." Whether we undertake to grow garden or field crops, flowers, shrubs or trees, next to the life-giving rays of the sun, rain is the one essential thing on which we depend. What is rain? "Why, falling drops of water from the clouds." Foolish question to ask, is it not? No, not entirely, because rain can be better defined by saying, "it is condensation of moisture." Fog, vapor, steam in the kitchen or from the locomotive, mists, etc., are essentially the same as thunder-storms. They are all formed in the same way, viz; the moisture in the air comes in contact with a cold substance and is condensed. Whether it be the almost invisible drop in steam, or the larger drop in mist, or the half ounce, pelting little globes in the thunder-storm, they were all formed in the same way, by condensing invisible moisture. The size of the drop depends on other combined agencies. On every square inch of the earth's surface—at sea-level—we are told, there is about fifteen pounds of atmospheric pressure. Go

into some people's corn or potato fields and, behold! you could not drive a crow-bar into the soil in July or August. No matter how much moisture there may be in the air, how can it penetrate the ground, and condense in particles of water for the roots of the plant, under such conditions? It is impossible; and the crops famish. Haul a load of hot, dry sand and place it in a heap on this same baked soil. Two days afterward thrust your hand into it and you will find moisture. How did it get there? Why, as soon as the particles cooled off, the air penetrated the

Photo 79, Rainmakers.

sand, and every tiny little grain became a condenser. Bring a basket of potatoes out of the cellar, on a warm, spring day, and in fifteen minutes they will be "sweating." Why? They are cold, and condense the moisture of the warm air. Same explanation for the mouth of your pump "sweating" as you force the cold water through it. Same answer for the "sweating" of the ice-water pitcher, and all the "sweatings" on stone floors, cellar-walls, etc.

There is a kind of a paradox in the question of a water supply for crops. In heavy lands, it is absolutely necessary to take the water away in order to procure a supply. That is, you take

away the surplus water in order that you may be able to plow and till the soil and thereby admit and **condense** what is in the air, for the constant use of the plant. The crying need, for the heavy lands, is "drainage." Ten million dollars in Ohio, alone, would only be a fair beginning of what ought to be invested for first-class underdrainage; and nothing would pay bet-

Photo 80, Yielding Abundantly.

ter. Then your "rain-makers" could be put into operation. You can see them in Photo 79. Photo 80 shows a piece of land that had been "skinned to death." It was purchased by Mr. J. E. French, Wickliff, O. First thing was underdrainage; then they could go in on it and work it. Rye and other green crops were plowed under; manure, lime, etc., put on, and here, at the end of three years, is the reward: Corn fourteen feet high!

The agricultural lands of America are waiting not for "hogs" but farmers; those who understand soils and drainage, and who, from the bottom of their hearts, in good old Grange style, can shout, "Three cheers for the plow, spade and hoe!"

PEAR BLIGHT.

I repeat here what I stated in the old "Tree Doctor," namely; that peculiar class of maladies, which we call "blight," does not "attack" and "kill" any tree or plant. Wise men sneered at the assertion. Did not everybody know better? Did not everyone see Pear trees "blighted?" Had not every ruralist seen whole fields of potatoes swept by the "blight?" Had not Prof. Wait examined "pear blight," named the bacteria, placed it in "culture," described its life and habits? But, readers, is it not true that all who have discovered and named the microbes of the various "blights" have said in plain words (or language that would imply the same), "These attack and kill the tree?" (or plant.) The impression that is left by all reading that I ever ran across on the subject is that these little foes "attack" and "kill," just the same as a burglar would "attack" and break windows and doors of a house, then enter and "kill." This is a grave error.

Do not our leading physicians all claim that microbes of every disease are existing all the while in the air? One said to me: "If I were to subject the saliva on your tongue to microscopic inspection I would find there germs of all diseases common to this locality;" and Dr. Kellogg remarks that a perfectly healthy stomach will actually digest and make food of those minute creatures. Therefore, as to whether an individual or a community is "attacked" by the microbes of any "disease," will depend upon whether we have sinned. "Sin is the transgression of the law." The laws of Nature are the laws of God. Health is the normal condition. If we overwork, underwork, drink that which is injurious, act the glutton, or in any way "transgress" law, we pay the penalty. If the function of any organ of the body is disused or misused, dead matter is formed, and on this dead matter the microbes feed. They have a right to do this; that's what they are for.

When anyone writes or speaks of the germs of pear blight "attacking" a tree, he is presenting a grave question in a very erroneous and misleading manner. The "attacks," so-called, of the microbes are only after an injury has been inflicted by some other cause. The whole tops of Pear trees may be frozen and turn black; in consequence of this all the cells in the leaf are ruptured. In the decayed matter of those dead leaves you have the feeding ground for the germs of the "blight," so-called. A portion of the bark may become scalded in the hot

Photo 81

A Story of "Blight."

sun with the same result. The tree might be standing on a southern exposure in light, sandy soil, and might start into bloom too soon, be nipped with frost and show what is sometimes termed "bloom-blight." It might so lack water in this hot, dry situation, that a part of the twigs die in July or August. This is called "twig-blight." In none of these cases does this microbe produce what you see and call "blight." Some injury is first inflicted, then they take possession and have a right to. Their working on such leaves or injured branches, adjacent to the sound portions, undoubtedly will augment and intensify the trouble.

Photo 81 tells a story about "blight." A field of potatoes, planted June 15th; land plowed, worked—all the same; same

seed, same cultivation. The field, a stiff clay, lacked fertilizer. August, hot and dry; the plants worked, pumped, struggled, drew all the water from the soil. One by one the leaves drooped, faded, turned black; a veritable case of "blight!" Millions of billions of microbes at work! Of course they were! Fools if they didn't when they found such a glorious opportunity. The dead stalk, to the left, with four little potatoes, was above the average yield of the field. But at one end of the field was quite a lesson. A few vegetable pits had been dug—two feet deep—the fall before. The following spring the straw, leaves and all such rubbish were thrown in and plowed under. While the main field perished of thirst in August, all plants standing over those old vegetable pits went on growing, growing, growing till October 8th, when a frost killed them. A plant was dug the next morning and the tubers under it are shown, together

Photo 82

Potatoes on Clay Soil.

Photo 83

Healthy Bodies Uncongenial to Germs of Disease.

with the frost-bitten top, in the right of the photo. To sum the matter up, freeze or otherwise kill the foliage, and your "feeding" roots die. Or kill the "feeders" and your top must perish; there is nothing to keep it alive, they "blight" sure as fate. Can't you almost hear the buglers of the armies of those "blight" germs that float in the air, tooting merrily: "Away! away! for here's decay! Potato tops are dead as hay." Reasonings on the problem have not been sound. They have been just as correct as the fellow who found the carcass of a horse in the ditch, in summer, and declared: "The **flies** killed that animal; the proof is that the body is full of maggots!" The facts were that **something** killed the horse, and **because** he was dead, therefore it was the appropriate feeding place for the maggots. If you have a case of "potato blight," ascertain if the soil is too wet, and the roots have drowned. If so, underdrain the

field. Is it "dry rot" (or "dry blight")? Then the field probably needs some "green crops" plowed under and other fertilizers and possibly subsoiling to give depth for the roots.

No "blight" is seen in the piece of potatoes shown in Photo 82. Though that is clay soil, it is underdrained, subsoiled, and well manured. Germs of disease cannot grow on a healthy body. The Hydrangeas in Photo 83 teach the same lesson. If it has root protection, the young plant usually has the freshest foliage. In this case, however, one by one, the leaves have

Photo 84

W. I. Chamberlain, Hudson, Ohio.

dropped off, because the little flower pot (like millions of others) has been again and again subjected to undue heat and lack of water. But see how robust the larger one is in the big tub of earth. This does not dry out, therefore the vigorous foliage in which all the new wood is manufactured. How long will it take the world to learn that the top can be no better than the root, or the root any stronger than the top?

Among the successful apple-growers is W. I. Chamberlain, Hudson, O. The gentleman is seen in Photo 84. He "makes money" out of this orchard, though it is on clay land. But it is underdrained, and is plowed once a year. Oats, Hungarian grass, Cow-Peas or some other crop is raised and, toward fall,

cut and thrown under the trees to prevent the falling apples from bruising. Four years ago, all around Kent, O., Apple trees had what people called "twig-blight." It is produced in the following manner: The orchard lands are covered with a sod; the roots come near the surface competing with the roots of the grass for the moisture of summer rains. Being thus brought

Photo 85

The Feeder Roots are just Under the Drip of the Branches.

near the surface, the warm sun incites the roots to action prematurely in spring. This forces out the buds too early. Then, in May, there is usually a "dry spell." All growth, then, comes nearly to a standstill. In June come the copious rains, accompanied by a high temperature, and I have seen Apple trees shoot out, all over their tops, twigs ten or twelve inches long in ten days. Then comes the dry weather, the roots become parched; the tree cannot carry all the new growth, and most of these tender, spasmodic shoots perish because it is utterly impossible for the tree to sustain them. Now the howl goes up, "The Apple trees are **'attacked'** by 'twig-blight!'"

Photo 86

Among the Trees and Vines.

Any dead crop, plant or tree that has been killed with too much water, want of water, frost or any cause will be "attacked" with millions or, perhaps, countless billions of bacteria called "disease."

A century ago, and previous to that time, England was afflicted with "rust" in wheat and other grain crops, and also "moulds," "mildew," and such fungoid growths, until they commenced to underdrain and subsoil her wet-lands. Following her improvements in Agriculture came healthy crops, and the "diseases" just named largely disappeared because no "disease" can get a root-hold on a perfectly healthy leaf or plant. Create depth of soil, feed and keep the root of your plant or tree healthy, and none of the "diseases" will "attack" the visible parts because there is no possible way in which they can grow on healthy foliage. Tops that are "blasted" by chilly winds or "cut" by frosts are things over which we have but little control.

If a tree or plant is attacked by "leaf-eating" worms or

Photo 87
Sweeping the Ground.

beetles, it is another problem. But even in such cases, scientists tell us that the parent lays her eggs on the weakest plants, just as the fish goes into the shallow stream to spawn, from an instinct of safety to her young. Nine-tenths of your victory is won in having a healthy plant. "Pear blight," so-called, can be avoided by planting on eastern, western or northern slopes, avoiding the southern; and, above all things, give it a clay soil. If you have sandy soil, excavate a hole six feet in diameter and four feet deep, and fill, not with "raw clay," but with a clay loam. Keep the tree cultivated, and all dead branches and twigs cut out, as they appear, and you will have no serious trouble with "Pear blight." The climate of Great Britain is just right for the pear. In the too-hot or too-cold or changeable climate of the United States, it will always be subjected to more or less injury.

PEACH YELLOWS, ETC.

What is "Peach yellows?" Nobody seems to know. The most reliable, practical and scientific botanists have been employed by the U. S. Agricultural Department to give the subject a thorough investigation. They all agree in one thing, namely; "there is nothing in the disease that can be recognized as a living organism."

Nine-tenths of what is supposed to be "yellows" (perhaps ninety-nine hundredths) is **starved** or **dried-up** trees, or lack of potash or some mineral in the soil. The peach, like the pear, develops the flower before the leaf-bud is fully expanded. In warm winters, in north temperate latitudes, peaches are often brought forward too early and severely injured. Here, the peach ought to be coming into bloom from the twentieth of April to the first of May. In 1885, on the eleventh of March, peach trees

Photo 88

The Linden is Beautiful.

were in full bloom, about as those seen in Photo 91. That day the weather changed. Six days after, the thermometer stood eighteen degrees below zero. The result can be imagined!

A neighbor of mine has been a successful peach-grower for about forty years. His farm is situated on a high altitude. On the night of the sixteenth and seventeenth of May, 1895, there was a veritable freeze. Two inches of water standing in a wash-tub froze solid and bulged up in the middle. My friend, usually considered located "above late frosts," was caught this

Photo 89, Elm Leaf.

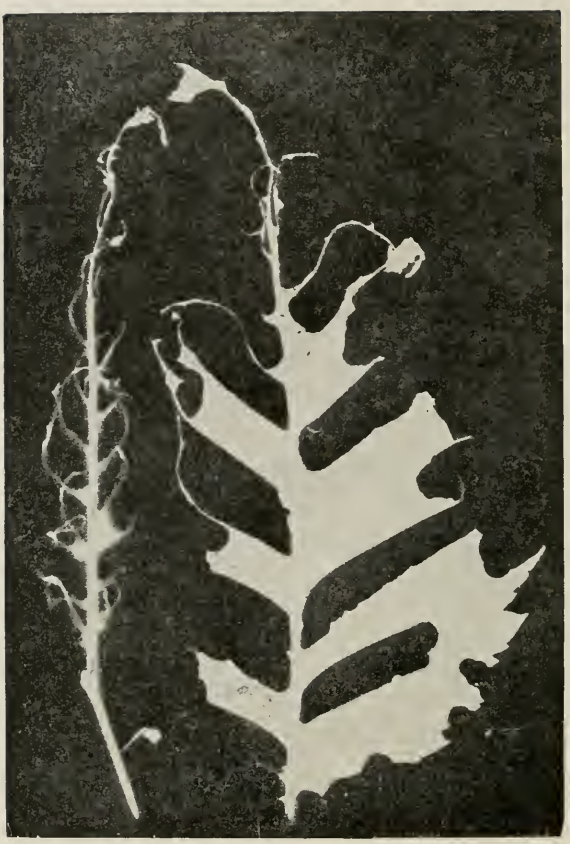

Photo 90, Wonderfully Made.

Photo 91, In full Bloom.

time. The next year the "yellows" appeared and nearly all this valuable orchard was dug out inside of two years.

I will make a suggestion by raising a question. Is it possible that a heavy freeze, at a certain stage of growth, by rupturing the protoplasmic cells of the new cambium layer, or the cells of the wood, or those of the foliage, or all combined, would so poison the system of the tree by the flow of this contaminated matter as to debilitate the whole, producing what would be equivalent to blood-poisoning? But all people are more interested in the following practical question:

HOW CAN I HAVE A HEALTHY PEACH TREE?

In Photo 92 you have what is as near perfection in peach growing as you would find. This is at the summer home of Mr. J. E. French, Wickliff, O. The gentleman is seen to the right.

Photo 92
Fruit Farm of J. E. French, Wickliff, Ohio.

Mr. Ferry, the superintendent, to the left, is one of the most practical fruit-growers whom I have met. He says he heads off "leaf curl" by pulling away the earth around each tree and putting about a peck of wood ashes to each one. These trees retain their foliage till late in October, after forest trees have become defoliated. With this prolonged season of "breathing," they go into the winter period of "rest," and are not in a hurry to unfold their fat, plump buds till the spring is fairly opened. Peach trees with a heavy sod around them, or otherwise starved, will often throw their leaves in August, and then, as moister weather comes on, start out a foliage from the buds that should have been held over for the following spring. This is very weakening to the tree, but it is a case of "the least of two evils;" if it did not do this it would die.

If you would understand the peach, proceed as with every other tree or plant, and enquire: "Where is its home?" The "home" of the peach, we are told, is on the table-lands of Persia, on the plateau of Iran. You have the "home;" what are the surroundings? The Caspian Sea on the north, the Indian Ocean on the south, and the Persian Gulf swinging in round the west. Here you have the modifying influences of three bodies of water plus an altitude of some five thousand feet above sea-level. If you will take the pains to look at your map, I think you will find that its "home" is in a latitude that would take in Tennessee. How can we expect, then, that a tree adapted to such a latitude, and at a high altitude, can be carried five hundred or a thousand miles farther north, planted on sea-level, on southern slopes, abused, neglected, budded from saplings—instead of matured trees—and escape the maladies to which it has fallen a victim? It is a marvel that it lives at all.

Don't plant the peach on lowlands, or on muck-lands, or heavy clay. Take a northern slope if you can; if not, eastern or western, **not southern,** because the tree will be apt to start too early in spring. In planting orchards, drain (heavy lands) and subsoil. For a few trees dig a hole four feet in diameter and three feet deep, fill with old sods and good soil. After trees get started (in orchards), plow every spring, but not closer than a perpendicular line with the tops of spreading branches. Work under the branches with disk-harrow, hoe or other implement.

Keep well cultivated till first of August. Then sow oats. These will make a good growth by fall, will dry the ground by pumping out the moisture, and the frost will then kill them (I am speaking of northern latitudes), and they will lie flat on the ground, and the roots of the trees, thus protected, will not be killed by freezing, as they were in Northern Ohio and Michigan in the winter of 1903-4. If planted on a northern slope (this is to hold them back in spring) a crop can be expected every season.

PRUNING.

This is not generally understood. If properly planted, the young trees make rapid growth and they keep on shooting out from the terminal, or end buds. Photo 93 shows how to handle the peach. You notice the shoot (this is last year's wood) that has the knife hung on it. Below where the knife is fastened, down to the left, are five fruit-buds; above the knife are six. If you cut off where the knife marks, as in the other sample, the

Photo 93

Prune Where Knife Hangs.

branch would then have more than it should be allowed to carry. Down still lower, below where the wrapping is fastened on, are several "wood-buds." When the top is removed, these lower wood-buds are forced into growth, and thus, if you desire, you can hold your Peach tree **down low,** in bush form; or you can run the original "leader" up five or six feet from the ground, and form a compact head by following the suggestions just given. In cutting off one-half of the fruit-buds, as here shown, you will have just as much fruit in **weight,** and the perfection and size of it will command from fifty to one hundred per cent. more in price.

THE GRAPE-VINE.

What a wonderful creature is this vine! Preached of and sung of in all ages. How one would like to "make a little speech" in its behalf! But it needs no introduction; it is here and here to stay. The people want to know how to procure its fruit. The camera will give you a few lessons; you should then increase your knowledge by reading and observation.

Photo 94
A neglected Vineyard.

Photo 95
Vineyard of a "lucky" Grape-grower.

Photo 94 gives a glimpse of the vineyard of an "unlucky" grape-grower. Photo 95 presents a view of the "lucky" grape-grower (Mr. Geo. Urban, Wickliff, O.) The "bad luck" of the one arose from planting and expecting a crop without working for it. Mr. Urban is a practical man. He fully understands that, if you desire potatoes, cabbage, corn, apples, peaches, grapes and, indeed, anything, you must prepare the soil, plant and take care of it, and Nature will reward abundantly, as is shown in Photo 96.

The "Tree Butcher" of the average community is also a "Grape-vine fool." He has read or heard from some source that the Grape-vine "should be cut back to one or two eyes," and all he knows about "trimming" the Grape-vine is to go "clip," "snip," "clip," present his bill and collect his money, for what? For destroying your crop of grapes!

Do you see anything wrong with the work presented in Photo 97? Probably not. That part to the left is thoroughly "clipped" and neatly tied, but the fruit is gone. All the fruit-

bearing canes—the last year's growth—have been cut off! (Think of the wisdom of this "Grape-fool!") One of the fruit-bearing canes was picked up and wound around and hung up so that you can see it. It has twenty-one nice, plump, fat "eyes" or buds, and each bud would produce one, two, or three bunches of grapes.

The same simpletons who have ruined the trees of the towns

Photo 96

An abundant Reward.

and cities of this country destroy not less than two hundred thousand tons of grapes annually; for the average mechanic and farmer copies their destructive methods, honestly thinking it is all right because the "Tree man" does it that way.

A year ago, Mr. T. G. Parsons, lumber merchant, Kent, O., sent for me. He had been unable to get grapes for six years. I showed him his error, and he preserved the new canes, and tied them up, as you see in Photo 98. He recently told me: "I

have seen beautiful pictures in catalogs and magazines, but never saw anything equal the excellence of my crop of grapes last fall." You should cut out about half of the weakest canes and all old, dead wood, and cultivate the soil, allowing no weeds to grow, and you will get grapes. They will grow in almost any soil, except wet muck-land, or heavy, soggy clay.

Probably the finest quality of grapes is grown in the "grape region," stretching from Cleveland to Willoughby, O. While

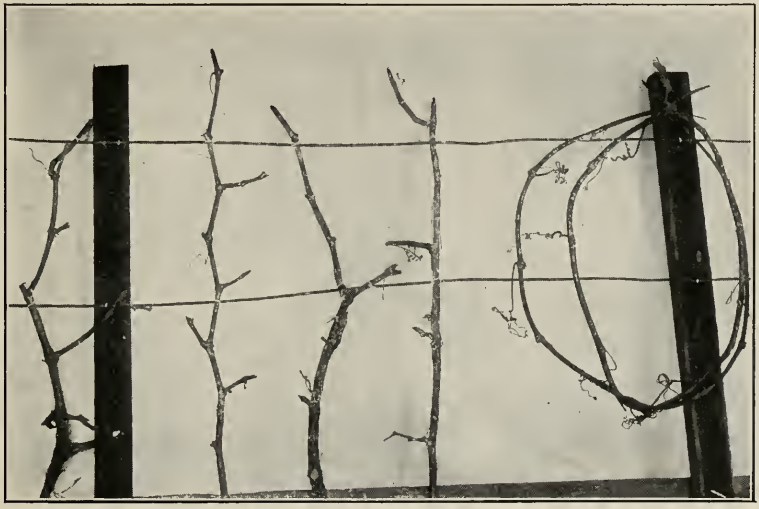

Photo 97

All the Fruit-bearing Canes Cut Off.

this is mostly clay land it is underlaid by a shale rock. The system of pruning followed by the grape-growers of the lake-front region may be called "a balanced method." They remove, probably, from half to two-thirds of the last year's growth. The remainder produces the fine crop shown in Photo 96, and still leaves the plant with reserved power enough to force out the new growth for the following year.

If you have old vines, on which there is no bearing wood, take a saw and cut them off close to the ground in December or January, and paint the wounds. Remove all weeds from near the old "crown." In the following season it will grow up a

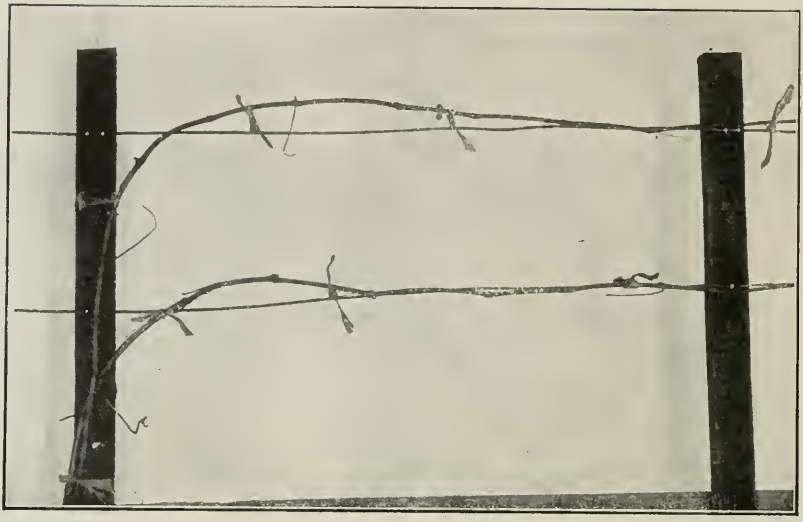

Photo 98, Properly Pruned.

number of vigorous canes. Train these carefully where you want them, or the strongest of them, (you will do well to pull off the weak ones) and the year after this you will have grapes that will "scare the natives." You will then have a new vine good for years to come. The grape does not require a very rich soil, but a little hen-manure or bone-meal will be helpful in poor lands.

In treating of the grape thus far I have urged the necessity of not allowing sod to grow around the vines. I know how people admire a good, heavy, green sward (none more than I do), but we must face the facts if we are to procure trees, vines or shrubs. Every tree is entitled to all the land it occupies, (out as far as the drip of the branches), but if you must have sod, plant less trees, but have a few good specimens instead of a lot of half-dead ones. In the last few years I have introduced what we call "the reservoir system," to save the sod and yet give a supply of water where a tree is suffering for lack of moisture. People often "water the tree," as they suppose, by sprinkling the lawn. The grass usually takes up every particle of such water, and the tree goes on "perishing by inches," pleading, crying, "water! water!"

Mr. W. C. Talmadge, Wickliff, O., has the largest, most majestic Elm on "The Ridge," running from Cleveland to Painesville. The top was giving out, the lawn was kept littered with dead twigs. He sent for me to ascertain what was the trouble. The test, in Photo 99, showed the soil "as dry as a powder horn." The faithful tree had labored and pumped every particle of moisture out of the ground. This was being repeated year after year. The rains were not heavy enough in the fall to penetrate the sod and reach the roots, and as a result, a grand old monarch, for which the owner would not take five thousand dollars, was in imminent danger of dying. To save this tree we put in fifty of

Photo 99

As Dry as a Powder Horn.

our "reservoirs," and the result was the building of an entire new top. How much better to spend a few dollars than to lose a tree that it has taken Nature a hundred and fifty years to build! You can get an idea of how the "reservoirs" are put in by Photo 100. A piece of sod, say a foot square, is removed; then a hole is dug, widening as it deepens until there is a cavity about the size of a bushel basket. The hole is filled to within six inches of the top with brickbats or stones. A piece of inch-and-a-quarter gas pipe, six inches long, is held in the middle of the hole while cement is being placed around it and over the stone. (Keep a plug in the upper end of the pipe to exclude dirt). Leave a hole

Photo 100

Placing the Reservoirs.

Photo 101

An Effort to make Poplars Branch out.

about three inches deep around the pipe for soil and sod. The soil should be tamped in and the sod pounded down, and everything kept away so that the cement will not loosen while it is setting. The end of the gas pipe comes through the sod, but on a level with it, so as not to interfere with the lawn mower. To water the tree, stick the nozzle of the hose into the pipe and let the water run until it overflows.

The ground under the Talmadge Elm was so dry that it took over three hundred gallons of water the first day the reservoirs were used. During one season they give this tree upwards of three hundred barrels of water. This, together with bracing it, will probably prolong the life of this remnant of the native forest for a hundred years—possibly two hundred.

The dying condition of the top may not be caused by the want of water. It may be from too much water; or, more likely, from a "deep filling" at the time of "grading." Whichever of

these three causes the trouble might spring from, the result produced on the tree is much the same. In every case the "hair roots," (that is, the real "feeders,") are first destroyed, resulting in the death of the larger ones. The supply of "raw material" being cut off, of course the "factories" (the leaves) close, and become a habitation of the disease germs constantly floating in the air. Then the twigs give out and decay runs back into

Photo 102

Trunk of Rathbone Elm, Marietta, Ohio.

the larger branches and, finally, the once beautiful top of a grand tree, while really but in youth, falls a victim to disease, death and decay. Never apply a remedy until you have ascertained the cause of the malady.

Photo 102 shows the huge trunk of the great "Rathbone Elm," at Marietta, O. Think of the wonderful, silent forces that have been at work to construct this great body for two centuries or more! Every spring as the Redbirds, Orioles and other songsters have poured forth their thrilling music from its top,

which is a "grove" in itself, this marvelous creature has undertaken to build a new concentric "ring" or layer to the already mammoth trunk. A million buds await the action of their invisible co-workers below. The majestic top, a little woodland in itself, has stood guard over the old Rathbone home, encountering the bleak storms and howling winds of six long months since its foliage was stripped and returned to mother earth. It has

Photo 103
Boston Ivy is the Best Vine in America.

seen the Ohio frozen and held for weeks in frigid bands and, anon, vapor that once spread over hundreds of thousands of miles, condensed and formed into irresistible torrents, sweeping from rivulet, gully, creek and river, swelling the banks of the mighty stream, inundating hamlet, village and old Marietta herself; but there this monarch stands (see Photo 13), awaiting the orders of a greater monarch, old king "Sol," who has just "crossed the line" and is about to give his behest; "Forward, march! six months' work ahead,"

Raise your hand, hold up a leaf in the other, placing the leaf beside the open hand. As you gaze upon the structure of the hand you may possibly think of the old scripture, "I am fearfully and wonderfully made." Can anything less be said of the leaf? Your hand has locomotion; the leaf has not. Does that argue anything against the wonders of the creation of the leaf? "But man is an intelligent being." Some are; some are not. (Certainly the "Tree butcher" and "Grape-vine fool" are not). Admitting, however, that man in general has some intellect, what has that to do with his being "fearfully and wonderfully made?" An idiot may have a better formed body (excepting the brain) than the president of a college.

You eat bread, meats, butter, fruits, vegetables, etc. Can you tell anything how some quiet, effectual and intelligent agency separates the substances into bone, muscles, finger-nails, hair and all the other parts of the body? Man knows absolutely nothing of how it is done. Now pick up a germinating elm

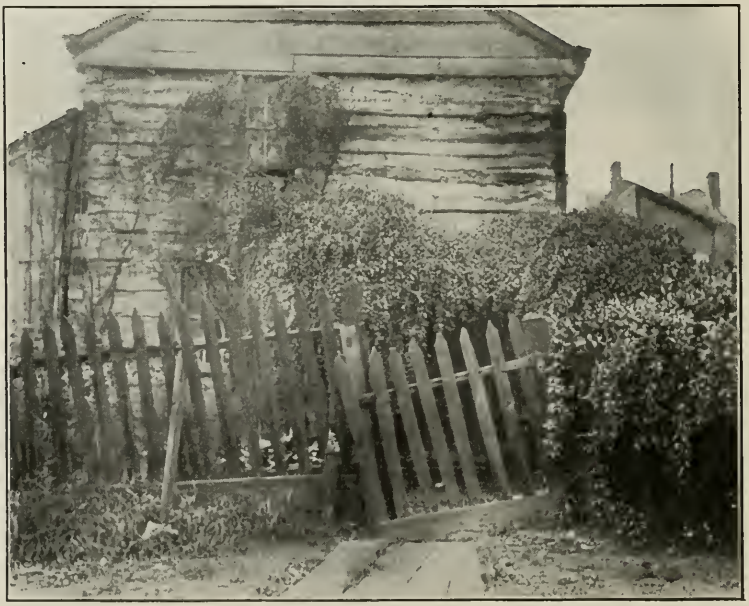

Photo 104

The Abode of Poverty.

Photo 105, Easily Grown.

seed. You examine the cotyledons, the plumule and radicle. You step back five hundred feet from the great Rathbone Elm. You hold up this little, new born, baby tree, then you look at the monarch of two centuries. Removing your hat, you draw near; you pluck one of its leaves; you are struck with its beauty; you look at its petiole, veinlets and veinulets; you admire its serated edge, (see Photo 89.) and if you have a microscope, you examine the parenchyma cells and stomata; and involuntarily you exclaim, "It is fearfully and wonderfully made!"

When we come to the subject of creative forces and understand how bodies are built and all parts of the food separated and carried to and used in their right places, the toad knows just as much as the man, and the tree comprehends as much as the toad. In this particular, all are on a level. An independent creative influence is operating alike on rattle-snake, horse and man; on grape-vine, rose and tree; on tulip, thistle and thorn; on mildew, mold and mushroom; everywhere—from the highest to the lowest—all are moved and controlled by that great, incomprehensible something that we call "Life."

Photo 106
A Vine-clad Home.

Photo 107
Wistaria covering Barn.

But, after all, man is a wonderful creature. He has powers, which, if wrongly directed, or not directed at all, may be used, among other things, in "butchering" millions of dollars worth of fruit and shade trees, ruthlessly destroying the world's forest and, ultimately, rendering the surface of the globe uninhabitable. But

Photo 108

Japanese Clematis in Bloom.

the very fact that a locomotive possesses the power to produce a "wreck" proves that it can be made serviceable to mankind. As set forth, further on, in the discussion of "future forestry," man must apply his powers of thought for constructive purposes. He will do so, he will learn from the mistakes of the past. His thought power will gradually work into harmony with the Di-

vine, he will fulfill the purpose for which he was created; he will learn that all living forces are a part of one great whole; that God is Life, and, therefore, all **Life is Divine,** and that our "high calling" is to observe, to learn, to teach one another what "laws" enter into the development of perfect health; to assist in the application of such laws, that Nature may hasten her great evolutionary work and that under the man's intelligent planting and fostering "the desert shall rejoice and blossom as the rose." With all the blunders and, apparently, "cussedness" of man, published in daily papers, he is still a **wonderful creature!** May he learn to better the world and thereby glorify the Creator by Whom he is so highly endowed.

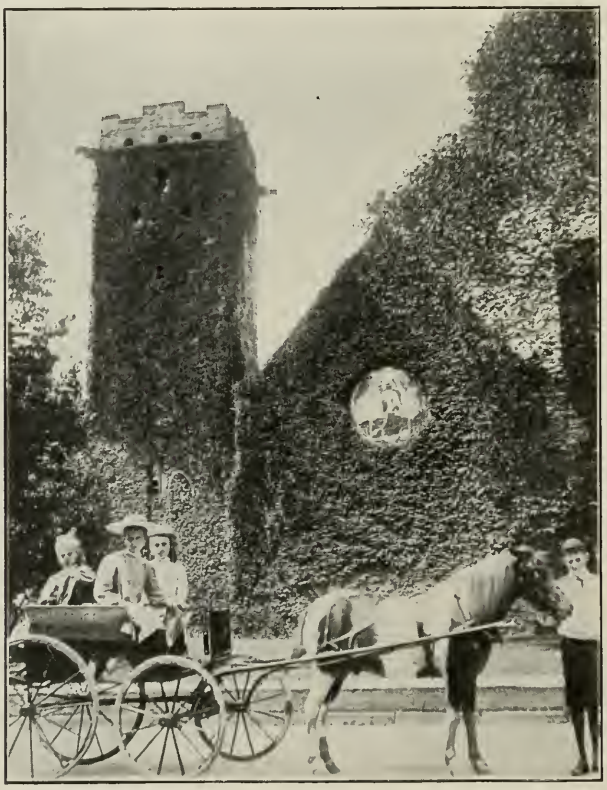

Photo 109
Church at Sewickley, Pa.

CHAPTER IV

A Serious Situation—City Parks Suffering in Consequence of Political Corruption—Commissioner Walgrove's Statement —Practical Schools Needed to Train Young Men to Handle Trees—The "Boarding House"—Home or Hell?— How to Grow Flowers—The "Five A. M. Formula" —The Tulip and Hyacinth—The Rose—The Rhododendron — How to Grow the Common Flowers—Ornamental Plants Chrysanthemum Growing — Causes of Failure — How to Succeed.

A SERIOUS SITUATION.

When I published the old "Tree Doctor," and it was heartily endorsed by practical men, agricultural and horticultural editors, and men of science, it was not received by the "Tree men" of large cities. I had heard much of the grandeur of the parks in Washington City, Boston, New York and other places. Oh! how I longed to see the fine specimens at the National Capitol! The time came; but holy horrors! the very first park I went into (Smithsonian) I found "butchered" just the same as an ordinary street of a northern city. I went on to Richmond, Va. Surely here in this old Capitol of the South, with the skill and taste of centuries contributing to its welfare and glory, something redeeming would be found! But the very home and resting-place of southern heroes is desecrated by the same monster—**the tree butcher!** I turned toward Bunker Hill and, while not so bad, sad havoc was seen on every hand, in and around "the hub of the universe." The condition of the trees in Philadelphia and Harrisburg have already been spoken of, conditions woeful beyond description! The parks of New York are an improvement, but they show a lack of skill in caring for the trees in a manner to prolong their lives. Central Park has some fine trees, but many

are "crotched" and split. Others are afflicted with huge wounds and some with large holes from which the trees are rapidly going into decay. I think that in the city of New York there is a due appreciation of the park trees and, surely, the people cannot afford to lose them. But it was in this city that I learned a lesson of a very serious nature, which seems to apply to all the cities, and explains why the trees are in such a condition. Read care-

Photo 110

A Bank of English Ivy.

fully what follows. I think you will be satisfied that all states should frame laws so that the park commissioners may be endowed with powers by which they can produce the best results on the trees of their respective communities.

On June 13, '06, I had the pleasure of giving my stereopticon lecture under the auspices of the North-Side Board of Trade of New York City. Hon. Geo. M. Walgrove, commissioner of parks of the borough of Bronx, was present, and asked me to call on him at his office at Claremont Park. I did so. We looked

over the trees and found a great number in a very bad condition. He asked me if they could be saved. I pointed out those that could be restored, and stated the approximate cost. I found Commissioner Walgrove to be a very honorable and candid man. Said he, "I will now tell you how I am situated. There is just so much money appropriated by the city government to run this park system. So much has to be spent on drives, so much for

Photo 111

A luxuriant Growth.

this and so much for that. There is but a small amount to be spent on trees. But the worst of it is I have no power to hire skilled labor for this work. The men are sent to me from the Civil Service Department, recommended as suitable persons to look after the trees. It is possible they know enough to put on a pair of spurs and mutilate a tree, as they would climb a telegraph pole; they may not know that much. They may not know enough to grind an ax with which they would "butcher" a tree. These men are "recommended" to the Civil Service De-

Photo 112
A Substitute for Awnings.

partment for some political service rendered. I have not even the power to discharge them; all I can do is send them back to the department that sent them to me, and prefer complaint against them. That is how I am situated; I am utterly powerless to do what I would gladly do, and what should be done for the good of the city." I may add that in Claremont Park, and also in the Bronx Park, there are some large, rare, and valuable trees, specimens that New York City cannot afford to lose, but they are dying because the curse of politics renders it impossible to save them.

I am not aware that Commissioner Walgrove intended the foregoing as "private conversation." Indeed, I take it for granted that he will be heartily glad for me to put it in print. Why should such a hustling, energetic man, a man with good taste and sound judgment, have his hands tied thus by the petty politicians of New York City? A man is not supposed to be ap-

Photo 113
The Charm of the Veranda is the Vine.

Photo 114
Beautiful, but Hard on Trees.

pointed to such a position unless he has manly discretion. Why hamper him as if he was a ten-year-old school boy? Is this a specimen of "governmental control?" If so, then from "governmental ownership" "Good Lord, deliver us!"

I suggest that the press of the country take up the workings of "Civil Service Reform" and see if it does not, in itself, need a reformation. President Cleveland undoubtedly aimed to correct an abuse; "To the victors belong the spoils." But it would be well to ascertain whether a greater evil is arising from an usurped, concentrated power by the Civil Service Boards.

A park commissioner should certainly have the power to expend the money appropriated for trees, in the manner to bring the best results. If the amount allowed for this be too little, let the papers discuss the question for the benefit of the public. Year after year the trees are perishing in the smaller parks, such as Union Square, Madison Square and the like. As set forth in "A New Era in Tree Growing," the trees that are

Photo 115, Nature's Handiwork.

dying in those smaller parks might be preserved, some of them, for hundreds of years. To have the fine trees of Central Park go into premature decay through neglect or from political evils is a thing that the metropolis cannot afford. The same might be said of any other city. To allow the selfish rottenness of politics, indirectly, to ruin the park trees is a thing that no thoughtful American should tolerate. Who will "move" to save the city park trees?

There is no way in which a correct estimate could be made of the damage done in this country by the "Tree butcher." Look at his criminal work on the Poplar tree in Photo 101. The fool made up his mind that he would "make them branch out!" Compare his brutal work with Nature's accomplishments in the Lime tree in Photo 115, and the arching of a street, as shown in Photo 116.

Photo 116, An arched Street.

Photo 117, A Boarding-House.

Well, it is no use to spend more time in "firing into" those poor numskulls who are not responsible financially or in any other way for the incalculable damage that they have inflicted on the country. The question arises, how are we going to stop it? The first thing is for the whole country to recognize the planting and care of trees as a **science.** Whether recognized or not, that's what it is, and as long as the people ignore the fact, just that long the country will be over-run with illiterate creatures, of all nationalities, who, if they own an ax and saw, will pose as "Tree men." If a community must support such a class of vandals, raise your tax levy and pension them, but **keep them away from the trees!**

We have agricultural colleges that are doing considerable good, but they are not as practical as they should be. Often a young man from the city will take a three or four years' course in a college and come out as a "farmer." What is needed is not simply a class of graduates with diplomas of standing in the classes of a college, but **workmen.** In this respect, Europe is a

Photo 118-a, A Log Cabin.

long way ahead of us. I find a very large majority of the florists, and gardeners of rich men's estates, in the east, are from Europe; also many of the superintendents of those estates. Why take the foreigner? Because we are not producing "**workmen**" at home. Let every state take this matter up, and establish institutions in which they can turn out not "theorists," but men of practical knowledge. While the states are not—as yet—equipped for this work, I am taking young men out of the colleges and putting them under special drill.

In Photo 117 you have a view of a first-class "boarding-house." Here drifts the one whose system is filled with nicotine; the one whose body is steeped with alcohol; the criminal who has ignored the God of Nature, filled his stomach with trash that would make a dyspeptic of the toughest dog; and last, but not least, there gravitates to this beautiful spot the noble but unwise man who has nearly wrecked that divine machinery, the **brain,** all for what? To see how much he can "own." Great heart, manly soul, have you ever answered the question, "Whoever '**owned**' anything?" Cease to pay your taxes and the State will soon show you who is the "owner." Go on and pay your

taxes and, in a few years, death meets you face to face and, in a calm but firm tone, asks, "Whose are all these things?" Here in this excellent "boarding-house" they all try to forget those antagonizing forces that have produced the gray hairs, and ruthlessly plowed deep furrows across the once smooth brow that received the tender kisses from the mother's lips, who sang her children to sleep in the little log cabin which is still "though lost to sight to memory dear." Here these sinners (for "sin is the trangression of law"—**any** law), commingle, drink mineral water and recuperate. As the birds have twittered their last vespers, and darkness is creeping on, instinctively from memory's store-house there come to the lips the language of childhood's early days: "Now I lay me down to sleep," and with that come visions of mother or sister in the old log home, reading from the old school book: "Turn backward, turn backward, Oh, years in your flight, make me a child again just for to-night!" Once more the blessed angel spirit of mother seems to hover over the erring soul which fervently breathes, "Rock me to sleep, mother, rock me to sleep." Coming into obedience of divine law, "He giveth his beloved sleep," and all arise to hear the song of birds, and to remark: "How delightful it would be to return to 'simple life.'" Well, blessed is he who never departed from it!

If you will turn back to Photos 103 and 104 you will see a strong contrast in two Pittsburg abodes. Either one may be "h-o-m-e or h-e-l-l," according to the character of the people who occupy them; for riches do not—in themselves—make demons, nor does poverty—in itself—make saints. It does, however, sometimes happen that a mansion may be a cradle of indiscretion that ripens into vice, culminates in murder, followed —for months—with a thousand newspapers pouring a continuous stream of the vilest filth (the "suit") into the minds of millions of youths.

Young people, in entering married life, whether you secure a "home" or a "hell" will depend not on what you **have** but what you **are**. You look into the future and contemplate a "home;" a real "home" for yourselves! Did you ever see a "home?" Let me show you one; it may be a log cabin, or ruder still.

The work in the field is done for the day; Jim and Bill have

been "rubbed down" and are munching their oats in a manner that shows that they are possessed of a kind of unconscious feeling that they have performed their duty, and are at peace with all creation. Mamma has milked the "Bossie," and cheerily calls toward the garden, "Supper!" Papa has now washed and is seated before a plain table with clean table-cloth on which are setting the sweetest milk, purest butter, best of bread, freshest of vegetables and the most wholesome fruits. All are or-

Photo 118-b, The Dutch Oven.

derly seated and—**hush!** "Heavenly Father, we thank Thee for protection during another day, and for all the blessings of life: We ask Thee to watch over us in the silent hours of the coming night, and help us to live for the glory of Thy name. Amen." Supper is over, and Flossie helps mamma "do the dishes," while little brother goes with papa into the garden, looks over the vegetables, then waters the flowers and vines. The twilight deepens; Jim and Bill and Bossie are "turned out to pasture," and all are "washed up" in readiness to take a peaceful night of slumber.

Flossie reverently kneels by the mother's side: (**Silence!** ye men of bewildered and overworked brains.) "Our Father Who are in heaven; hallowed be Thy name; Thy kingdom come; Thy will be done on earth as it is in heaven; give us day by day our daily bread and forgive us our trespasses as we forgive them that trespass against us; lead us not into temptation but deliver us from evil, for Thine is the kingdom, the power and the glory, Amen. God bless mamma, and papa, and brother and dolly and pussy-cat and doggy. Amen." Little brother is also weary and ready for a refreshing sleep, and presents his usual request: "Papa, please sing for me." Papa takes him in his arms and sings:

"When mothers of Salem their children brought to Jesus,
the stern disciples drove them back and bade them depart; But
Jesus saw them e'er they fled and sweetly smiled and kindly
said: 'Suffer the children to come unto me.'"

Day by day thus passes, and the years roll by; and it is here the nation's heroes are formed; for, as one has said: "No man will take up a musket and fight for a boarding-house, but any one will give his life for his **home.**" "Home" is where pure, faithful, self-sacrificing spirits are blended in oneness of purity of thought and purpose; the nearest approach to heaven on earth. But the bliss of the earthly paradise is not always unalloyed. One evening little brother's head is feverish. The doctor is called, and the days go by, until, at last, he presents the request: "Papa, won't you sing for me once more?" Mustering courage, papa sings the last verse of the little mission song that little brother so much loved:

"Oh, soon may the heathen of every tribe and nation,
Fulfill Thy blessed Word and cast their idols all away:
Oh! shine upon them from above and show Thyself a God of
love;
Suffer the children to come unto Thee."

A little angel was permitted to stay in the **"home"** for nine years, then departed.

Well, well! new bread for supper. See! they are taking it out of this old Dutch oven (Photo 118). "Here chickie, here

chickie" (Photo 119). I declare! fresh eggs too! Who wouldn't like to have a "home" on a farm, particularly in the summer time?

Photo 119, Fresh Eggs, too.

HOW TO GROW FLOWERS.

There is not one in a thousand but loves flowers—some flower. All would like to know how to procure them, but very few like to comply with Nature's inexorable laws, **study** and **work,** by which they are produced. It is an universal law, that which costs us nothing is but slightly appreciated. How many have a full appreciation of fresh air and sunlight? What proportion of humanity is thrilled with the charm of Spring, the glory of Summer, the beauty of Fall and the voices of Winter's endless tales? Oh, yes, all say, "it is pretty," "it is lovely," "it is too hot," or "too cold," etc. There is no stronger proof that

the "God over all" is infinite in his attributes than in the fact that He "bears" with the ingratitude of his erring children. Logically speaking, however, this long suffering is a necessity, to a certain extent, because man is to so improve that, harmonizing with the will of his Creator, he will yet be the instrument by whom this world will be converted into a paradise, the perfection, utility and grandeur of which, as yet "the eye hath not seen nor ear heard," and the proof of these future accomplishments—by man—lies in **what he has already done.**

Do you want to grow flowers? "Yes, yes, of course we do." All right; intelligence is the first thing. In sixty years I have been able to gather up a little knowledge, and I offer it to you; but are you ready to "do the doing?" If you will, then you can have "crops" of any kind, but we will confine ourselves to flower-growing at present. I will suppose that you are a clerk, mechanic, or in a situation in life that you cannot consistently hire your work done. Are you ready to "cut out" the vaudeville, club meetings, and all the other night-meetings which necessitate your being "called in time" to eat a soft-boiled egg, and then run to catch the car to get to the office in time to look in the mirror—before your day's work begins—to see that your head is "silvering" at the age of forty? You are! All right; listen:

Did you ever dig a ditch? A real, underground drain, three feet deep, lay the tile, etc., with your own hands? You didn't! Then you have missed half of the pleasure of life! You proceed thusly: You arise five A. M. (four A. M. in summer) and work two hours—real work; then instead of your wife bending over you and whispering, "Dearie, it is seven-thirty, you will have to hurry to catch the car. Is there anything you would eat this morning?" you will lay aside the pick, spade and shovel, and as you hurry through the hall to the bathroom yell, "Hey there, wife, I'm as hungry as a bear; got **anything** to eat?" So it comes about, in a kind of unconscious way, having created a stomach that you feel would digest rat-tail files, the first crop you grow is that of "roses" on your cheeks, and you will no longer wonder where such rosy cheeks have been procured by the millions of foreigners that bless America, but become themselves cursed—when they have learned America's habit of turn-

ing night into day and loading their stomachs with things that would "debilitate" a hog.

Photo 120 presents a very fine "flower-bed" and the average person has no objection to the crimson crop of strawberries that follows. But our modern strawberry is an evolution. In the great struggle for existence, the tendency is to strengthen and develop. This is true in plant life as well as in animal. The

Photo 120

A fine "Flower Bed."

Strawberry, in the United States, has received a great deal of attention. It sometimes seems almost incredible the size and perfection to which it has been brought. But another fact is just as forcibly true, namely; cease to give it the care under which it has been "developed" and it speedily deteriorates.

If your land is damp and soggy, the first thing needed is underdrainage. If you can get the "fall," dig three feet deep, (two and one-half may do). The size of the tile should not be less than three inches. Then cover the tile with a foot of cinders,

Photo 121

Tulips Unsurpassed in Beauty.

if you can possibly procure them; if the cinders are used and you have a solid bottom, uniform rise and good outlet, you have a drain that will last for ages.

In my travels, I have seen some very large Tulip beds, much larger than those shown in Photo 121, but I never saw anything surpass their beauty and perfection. I took the picture at Mr. Wm. B. Barnum's, Quaker Ridge, Mamaroneck, N. Y. Mrs. Barnum is seen in the photo, and "Uncle Joe," the Scotchman, to the left, evidently puts to good use the education in thoroughness characteristic of the training of the old countries. Tulips, Hyacinths, and most bulbs should be planted in the fall; the latter end of October is a good time. If your soil is wet, don't forget the drainage. Tulips are great feeders. Suppose you have a circular flower bed, eight feet in diameter. Put a stake in the exact center, throw a string around it; strike the radius that you want; draw a mark around with a stick or peg. Take

a spade and cut right down in this circular line. Take out the earth one spade deep, and lay it outside. If the remaining soil is good and deep, spread over it about three inches of well rotted barnyard manure. Spade it in and work it up together with spading fork.

You are now ready for planting. Set your stake again in the center, draw a line six inches within the border; other lines eight inches apart, to the center. Press the bulbs down in this soil, full depth of bulb. Arrange colors to suit taste. White in the center, then yellow, then red blend well. Now take the top layer of earth which has been laid aside, and spread all over the bed, raising it slightly in the center. Rake off in neat form, and your work is done. While it is not absolutely necessary to "cover" a tulip bed, yet by spreading, say, six inches of coarse manure over it after New Year's, removing it about the middle of March, does give a more uniform crop. Proceed in the same way for the Hyacinth. To grow the Tulip or Hyacinth for the window, put them in four or five-inch pots, the same time as you make the flower-bed. Plunge the pots full depth into the soil, in a sheltered place. Upon freezing, cover with a foot or more of coarse manure. Carry to the house as you need them. After placing in the house avoid freezing and never let the earth dry out.

"What about Photo 120?" Oh, yes, yes, I nearly forgot to tell you how to grow Strawberry flowers. Good soil, clean of weeds (clean as you can) and good drainage. A very good way is to manure the ground heavily in spring and plant to early potatoes. Let no weeds grow before or after digging. Cultivate in bone-meal after potatoes are dug. Adopt the Peter Henderson method of setting "potted plants," the latter end of August or early part of September. If you have no Strawberry plants, it may be your neighbor has. Gather up all the small flower pots you have, get permission to lay down some runners. You do it in this way: Select healthy plants, fill the flower pot with soil and with trowel or hoe dig a hole and sink it—full length into the earth. Take the runner and place the newly forming bud right on the earth in the flower-pot. Put a little stone back of the young bud that is forming to hold it in place. By the end of August the flower-pot will be full of roots and, if you make

your new bed from this kind of plants, you will have a nice flower-bed next spring, plus the fruit. You practically gain one season by this method. This first summer no weeds should be tolerated, and the second season you will get a mammoth crop. That should be the last of this plantation, because it is difficult to keep down the weeds, and it is cheaper to make a new setting every season, spading or plowing the old plantation under and "rotating" with some other crop.

Photo 122, Dogwood in Spring.

If you cannot procure the potted plants, prepare the ground and have it clean of weeds, as before suggested, but set your plants in rows three feet apart, and plants in the row, fifteen inches apart, as soon as the frost is out of the ground in spring and it is dry enough to work. Let no weeds grow during the season and cut off the main runners, and the next season you will have a big crop. Some run them on for yet another season, but it is almost impossible to control the weeds.

In Photo 122 you have a glimpse of a very attractive "Dog-

wood." These grow finely in sandy or gravelly soils but are not favorable to wet, heavy lands. Drainage is the only thing that would induce them to do well in the heavy soils. Their beauty of coloring, in the fall, is equal to their charm in spring. Shortly after the Dogwood, come the flowers of the abundant blooming "Black Locust," so-called. This is one of the greatest honey producers. (See Photo 123).

Photo 123

The Black Locust in Flower.

A WOEFUL MISTAKE.

I came to this country (Northern Ohio) in 1873. In the late spring and early summer months "all Nature teemed with delightful existence." Bees were buzzing and humming on all hands. The wild bees were yet in abundance in the hollow trees of the native woodlands, but as the forests yielded to the brutal ax, the "bee hunter" "got a corner" on the busy, beneficial, but helpless little creatures, and to-day there is scarcely a colony of wild bees to be found in a single county in Ohio. At the same time, epidemics have spread among the domestic bees, and we

have not a tenth of those faithful little workers that we need to convey the pollen grains to the particular organs of the flower in such a limited time as we frequently have between showers at the time when trees and vines are in bloom. Talk of bugs and insects destroying trees! Is there any class of insects, or all combined, that have done as much mischief as man himself? He has destroyed the forests and dried up the streams; he has butchered the buffalo and nearly all the "game," not sparing the song birds, and even robbed and killed his little innocent friends —the Bees. Yet this destroyer is to be the restorer and the instrument of universal redemption. The great crime of all crimes—of humanity—is selfishness. But the time is now at hand when man will learn that happiness consists not in living for self, but to live and plant for those who follow.

ROSE GROWING.

No rose, perhaps, has ever so "agreeably surprised" the people as has the "Crimson Rambler." Years ago I learned to "go

Photo 124, A Sturdy Rambler.

Photo 125

Ramblers are Prolific Bloomers.

slow on novelties." The first Crimson Rambler I saw made no growth for two years, and it looked like a "fraud." After its merits were learned, I planted some myself. They were set in September. From the following April to September they grew over nine feet. This was no "happenstance." The soil was a loose sand, but for each plant a hole was dug four feet in diameter and four feet deep. This was filled with two parts clay sod, and one part well rotted barnyard manure. Good, strong, one-year-old plants were used, cutting them back, and covering them, after Christmas, till spring. Photo 124 shows a strong old Rambler, cut back, and the vigorous, lower, young branches tied down to a frame, and three young canes tied up to a support in the center, rudely representing an old-fashioned candlestick. When in bloom, the whole was a blaze of glory. Photo 125 shows what a prolific bloomer the plant is. In making rose-beds, remember that drainage is absolutely necessary if the situation is wet and soggy, for though the rose delights in clay soils it cannot stand to be "wet-footed." If the soil is of a clay tex-

ture, add a plenty of old, cow manure and work it in deep, and the results will be a fine crop of roses. As before intimated, if you have sand or loose gravel, it must be removed and the clay (not "raw clay," as one would make bricks of, but a clay sod and subsoil—all mixed) must be substituted. In pruning (which should be done only in the spring), cut out all old wood, and one-half of the weaker of the new wood and slightly shorten back the remaining ones. Don't buy your roses or other plants of "Tree agents." Send direct to the nursery, and you will be apt to get what you call for, as it is to the interest of all such firms to keep up their reputation.

THE RHODODENDRON.

Photo 126 gives a view of a neat batch of Rhododendrons. This is one of the plants in particular whose home it is necessary to take into consideration. Where do you find it a native?

Photo 126, Rhododendrons.

Photo 127

Wistaria over Entrance to Garden.

About the same place in which you find the Pennsylvania Laurel, in the woods or on the ledges of rock where one would sometimes think it could hardly have a chance to live. But here, among the fragments of rocks, covered with decayed leaves, it derives its main support from the moisture condensed—in summer—by the cooling stones under and among which it rambles with perfect delight. In planting Rhododendrons avoid heavy clay soils. See, first, that the drainage is good, then use leaf mould and sand; or light "muck" will take the place of leaf mould. After the plants are set, spread over the surface three or four inches of rough gravel or crushed stone. Through this you can water freely in summer, and develop both plant and flower buds before fall. Failure to make this provision for getting water to the roots results in immature flower buds which are killed by severe "cold spells." The north side of a building is the proper place for them, but if you must put them where the bright sun will strike them—in winter—cover them with evergreen boughs, cornstalks or something that will shade them, or their leaves will "blister" and the plant be materially injured.

Photo 127 shows the pretty effect of the Wistaria trained over the entrance to the vegetable garden. The heavy vine on the end of the barn, shown in Photo 107, is also a Wistaria.

Imagine the glory of this vine when in full bloom! America is a country of "homes." Oh! that people would study the life of plants and trees and make it a nation of **vine-clad homes!**

Photo 128 is a demonstration of the fact that there is seldom such a thing as "can't." Right at that spot was an old road-bed (now in the lawn) where cinders and all matter unfavorable to

Photo 128

Thriving on an old Road-bed.

plant life had been scattered. It is desired to put a Hawthorn tree there. Very well, strike a circle eight feet in diameter; now dig to a depth of three feet; done. Now fill with sods, soil, manure, etc. We plant the Hawthorn; growing finely. Around it, and about eighteen inches from it, is a ring of the Japanese Iris, a gorgeous charm in the latter part of July. Then outside (hold on, don't pick them!) a ring of vigorous, healthy Asters. Oh, don't say can't;" **yes, you can** grow plants almost anywhere. A neighbor has some choice varieties of hardy Phlox; they go to seed; next spring the young seedlings come up thick, and a

boy lifts some of them and puts a row through the midst of the vegetable garden. Look at them in Photo 129. "I wish I could." I tell you, you **can!** Intelligence and **work**—that's all.

Photo 130 and 131 is the Hydrangea Hortensis in bloom in August, at Mr. Julian T. Davis' beautiful residence, at "Second Beach," Newport, R. I. (Blur in Photo 131 is not in the house, but on the negative.) The effect of the Atlantic breeze is no-

Photo 129

A Row of Hardy Phlox.

ticeably modifying for many miles inland. This Hydrangea will not "winter" with us in middle and northern Ohio. Neither will the English Ivy. Yet in the region of New York it does well. No healthier growth of the English Ivy could be found than is covering an embankment at Mr. Wm. Rockefeller's place, as shown in Photo 110.

In sending out a book of this kind, covering such a wide range of territory, no rule can be laid down as to what kind of plants to use. Learn what is suitable to your locality by inquiring and observation.

Photo 130

Hydrangeas in full Bloom.

Photo 131

Residence of Julian T. Davis, Newport, R. I.

A well-meaning person went to the expense of buying and planting Nasturtium seeds (see Photo 132;) they were the tall-growing kind, but it does not look like it now, on the twentieth of August. What's the matter? **Starved.** An ignorant day-laborer was hired to "make the flower-bed." He dug up the soil, and the good people planted the seed and talked and dreamed of

Photo 132, Starved Nasturtiums.

the "loads of flowers" that they would gather from this "great big bed!" Now they vow they will "never buy another package from that seed firm!"

Next spring, adopt the five o'clock rising. First morning, take the top layer of soil off where the flower-bed is going to be and lay it aside, then if you are down to gravel, clay or "hard-

Photo 133

They Rambled out into the Driveway.

pan," dig this out and wheel it away. Excavate not less than eighteen inches deep. Next morning, fill in with old sods, good soil and well rotted manure. If you have none on hand have it hauled. Finish off the bed and plant the seed, three or four in a bunch. Just press them lightly into the soil and lay a little stone over them. This little stone—an inch or an inch and one-half in diameter—will preserve moisture and prevent a hard crust forming and give you a chance to hoe all the earth between where the seeds are. Put the little bunches of seeds about a foot apart. Very soon the new-born babes appear, and after a few weeks they grow, and grow, and **grow!** They run out over the drive-way, (see Photo 133,) up on the bushes, out over the fence, and shout, "Give us room—**more room!**" and you will have to call in the

Photo 134
Occasional Shorn Trees are to be Recommended for the Country.

Photo 135
Boston Ivy will Cover a Wall Completely.

neighbors to help you train the vines and gather the long-stemmed flowers. "Luck!" Yes, sirs; nothing beats the five A. M. rising formula for "luck."

In Photo 132 in the distance is seen what was intended to be a "foliage-bed." Contrast the bed shown in Photo 135. The man who made this bed understood his business. Ricinus are

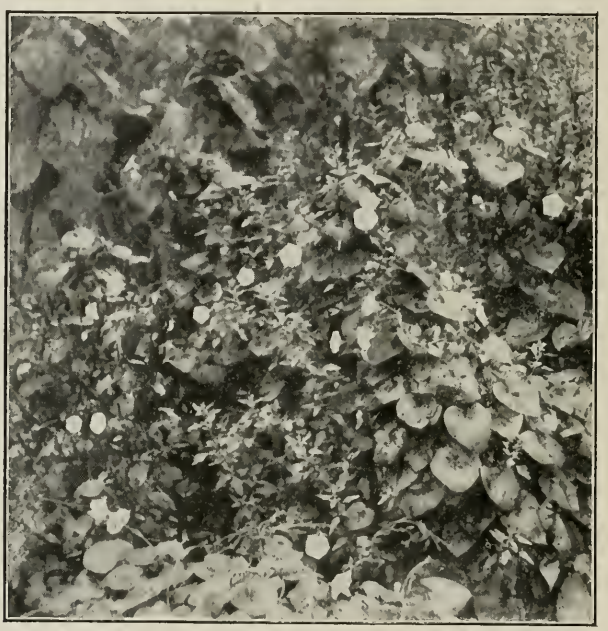

Photo 136

Used as a Screen.

used for the center of both. Cannas for the outside of the former, Caladium Esculentum for the latter.

How nicely old piles of debris can be hidden from view by planting a few morning-glory seeds, with sun-flowers back, as shown in Photo 136. If you have the grave-yard of fifty cats, the outlet of a sink drain, or a pile of old tin cans over the fence which your neighbor refuses to move, two five-cent packages of seed and one five A. M. rising will remedy the whole trouble. If you have a big rock on the lawn that you cannot remove, or any

other object not exactly agreeable to look upon, dig down deep around it and plant a package of seeds, preferably vines. Those seen in Photo 137 are the dwarf Nasturtiums.

Photo 137, Dwarf Nasturtiums.

THE CANNA.

The superb bed of Cannas in Photo 138 was fourteen feet high in the center. These were the old tall-growing, bronze variety, Robusta. It was surrounded with the "golden-bedder" Coleus. The "good luck" of this gentleman came from digging the bed (in elliptical form) three feet deep. In the filling, one big two-horse wagon load of cow manure was worked in. As the plants grew they were fed twice a week with nitrate of soda.

In the last fifteen years special attention has been given to the French flowering Cannas, as they are called. The hybri-

Photo 138
Superb bed of Cannas.

Photo 139. Flowering Cannas.

dizers have worked with a view of perfecting the flower even though it may dwarf the plant. A very fine display of the "flowering" sorts are shown in Photo 139. A beautiful contrast is brought out by the use of the variegated Abutilon as a border plant, seen in the picture. This is at Mr. Robt. Pitcairn's, Ellsworth Ave., Pittsburg, Pa.; and very high credit is due Mr. Robt. A. Smith, florist to the establishment, (he is seen among the Cannas,) for his efficient services in producing such excellent results. In growing "foliage plants," (that is, those grown for the display of the leaf,) **feed heavily,** the richer the food, the better the foliage.

The Echeverias are now used with very marked effectiveness in ornamental flower-beds. Photo 140 was a most exquisite piece of work. This I found in a small park in Allegheny, Pa. Would gladly "give credit" to the one who executed the splendid design, but did not learn his name. As can be seen, a mound was raised and planted with the different shades of Althernantheras, a panel being used for the figure so finely planned

Photo 140

Skillful Work in Small Park, Allegheny, Pa.

and wrought. The figure is constructed with the Echeverias, small plants being used for the throat and face, while the larger and coarser represent the hair and drooping curls. A very little Althernanthera is used for the eye-brow.

On a larger scale and equally ingenious is the train of cars, shown in Photo 141. This is on the far side of the railroad, at the entrance to Woodlawn Cemetery, New York. You can imag-

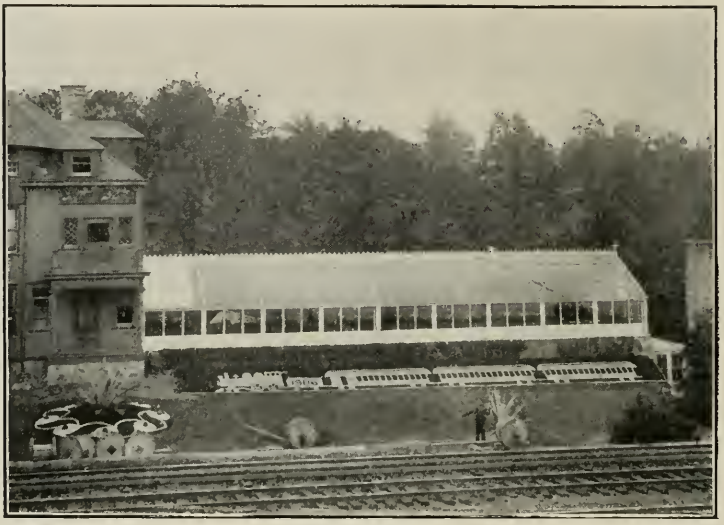

Photo 141

Train of Cars in Flowers, Woodlawn Cemetery, New York.

ine the fine figuring required to produce this design in such perfection. All the light portions seen are the Echeverias. The contrasting shades are produced by the same little, low-growing, bronze Althernanthera. These are worked in to produce the dark shades of the car windows, and the other dark shades above and below on the embankment. To those who are not acquainted with it, I will say the Echeverias are a flat, low-growing, fleshy plant, known by the old name of "hen and chickens." The house-leek which grows on the old thatched roofs in Great Britain belongs to this family. In growing these plants, also the Althernantheras, the order is somewhat reversed in the matter

of "feeding." Instead of digging deep and filling in with manure, the florist takes sand and clay, and perhaps a little bone-meal and aims, while it is kept growing, to produce a stunted condition of the plant. This brings out coloring, like the leaves

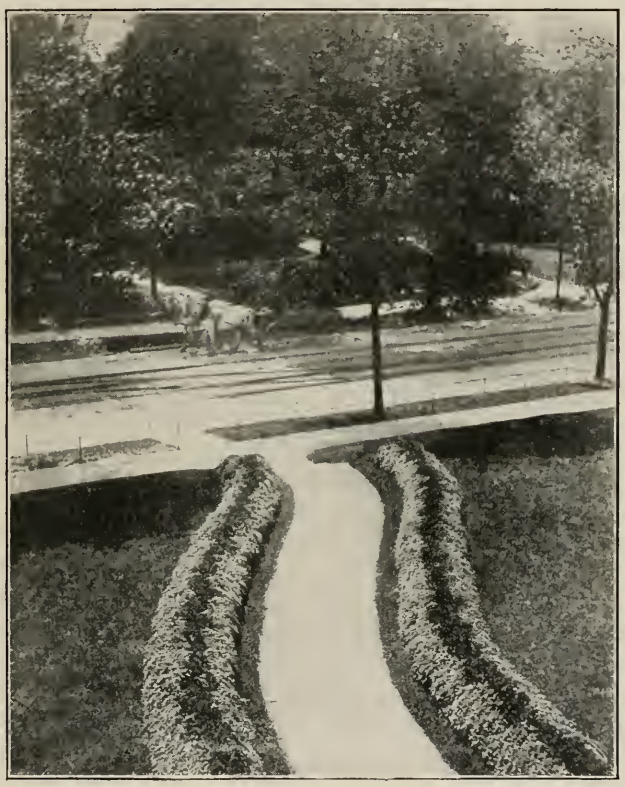

Photo 142

The Golden-bedder skirting Walk.

of a thirsty, half-starved maple tree will "turn"—even in summer. While the work of a florist is arduous, it is fraught with endless pleasure, and surely he lives not in vain!

Remember "foliage plants" in general, require **high feeding.** Make Coleus beds as rich as you like.

It is all a matter of taste as to what plants any person or

Photo 143

Everyone should Grow Lilies.

family shall use. A friend of mine says, "I hate a Coleus; would not have one in my lawn." Personally, I admire them, both because they have brilliant colors and because they make a display quicker than any other plant. The old Verchiffelti and Goldenbedder are two of the standards for out-of-door planting; they can be seen in the two rows skirting the entrance walk, in Photo 142. Those are highly fed, as the Coleus always must be to give satisfaction. A friend of mine committed a serious blunder. He made the Coleus bed "good and rich," and planted on the outer border a row of blue Ageratums. The Coleus made a marvelous growth, so did the Ageratums; they grew, and grew, and grew, but produced no flowers. Some people make the same mistake with the Geranium; in rich soil they will grow all to leaf, great leaves as large as a pie-plate, but no flowers, or very few. Make up your mind what is going in this bed, what in that, etc., then prepare the soil accordingly. If it is to be Caladium,

Canna, Coleus, Lemon-verbena, any of the scented Geraniums, in short, any plant that you may be growing to form a show of leaves, like the Ricinus or those already mentioned, then dig deep and use fertilizer almost without limit. But should you attempt to get bloom under such conditions (except the "flowering Cannas") you will fail, because such high feeding produces the same effect on all plants—**heavy foliage.** For all flowering plants, one would select a medium quality soil. About what you find in the average vegetable garden is just right. Such soil is usually rich enough to produce a healthy growth, and at the same time not so rich as to force it all to top.

Photo 144

Orchids and Tropical Plants.

THE LILY.

Lilies can be well fed and, in order to get them to do well, the bed should be "made," i. e.; dig everything out to the depth of, say eighteen inches. If too wet, attend to draining, tramp in old leaves and litter in the bottom, then use old sods and well-rotted manure, filling in fully a foot. Set bulbs, and cover to nearly surface with light soil, or sand and soil mixed. As the earth settles down use about three inches of coarse gravel on top. The object of using this gravel is to prevent drying out, and to keep the ground cool. Lilium Auratum, the "Gold-banded Lily," should be in every garden. See a fine specimen in Photo 143. Flowers are three feet from the ground.

It will be noticed that I frequently refer to **coarse gravel** or crushed stone being put on the top. The purpose of this is **root protection.** Millions of plants are annually destroyed be-

Photo 145

Use Boxes, not Pots.

cause people have not been educated to take care of the roots. They freely spend money to procure plants, then take them home and keep them in the little earthen-ware flower pots in which they are grown—for convenience—in the greenhouse. They put them on the window-sill, table, stand or anywhere, and sometimes water them, sometimes not, then wonder why the leaves drop off! and ask "if there isn't a worm or bug at the root," and complain that they have "no luck with plants." How many people get "luck" with the Fern? Hereafter, instead of trying to grow it in a six-inch flower-pot, with roots dried out, make a neat box, like you see in Photo 145, (at Mr. E. H. Jennings', Fifth Ave., Pittsburg, Pa.,) using plenty of leaf-mold or some light soil; plant out in this box, keep well-watered in hot weather, and you'll get "good luck" as sure as I am telling it to you.

You should bear in mind that a plant, while in the greenhouse, is surrounded by a moist atmosphere which is preserved by watering, spraying, or dampening the floors; hence, while a plant is kept there it will remain fresh, like the orchids, hanging overhead, or the tropical foliage plants, seen to the left, in Photo 144. The most favorable place in the dwelling-house for a potted plant is the kitchen; the steam from the cooking makes almost a greenhouse atmosphere, but the tops would not suffer so badly in the other (dry) rooms if one would give the needed root protection. It is a mistake to try to "winter" a large number of plants in the ordinary house. A few Begonias, Fuchsias, Geraniums, Primulas and, later, bringing in the potted bulbs, are all that should be attempted. There is but very little satisfaction from the attempt to grow Roses and Carnations in the average living-room. A good-sized Begonia can be kept growing in a four-inch pot if, once a year (in August), the plant be turned out of the flower-pot, the ball of earth plunged in a pail of water and nearly all the earth carefully soaked off, and repotted again. For this purpose, if you have not good "potting soil" on hand, purchase some of your florist.

In potting or re-potting a plant, always put gravel, cinders or some other substance in the bottom for drainage; and don't fill the pot quite full of earth; leave it below the rim an inch or so, so that it can "take water." Then, if you will take a larger

flower-pot, say six inches, put gravel in the bottom raising it high enough so that you can stand the four-inch one (having the plant) right in the center and bringing the top on a level with the outer one, and then fill the space between the outer and inner crocks with sand, your plant, thus treated, will do at least five hundred per cent. better than those that are left in the ordinary way. Certainly there is more pleasure with one good plant than a dozen half-dead ones.

New York City imagine they have a superb collection of plants in their conservatory at the Bronx Park; but the Phipps Conservatory in Shenley Park, Pittsburg, or, rather, the plants therein, are an hundred per cent. ahead of those of the Bronx. It would be difficult, indeed, to surpass the quality of the Pittsburg plants, or the skill displayed in their management. Photo 146 shows the naturalness of one of the tropical lily ponds. The

Photo 146
Tropical Lily Pond, Phipps Conservatory, Pittsburg, Pa.

Photo 147

Cacti, Phipps Conservatory, Pittsburg, Pa.

huge rubber-like leaves of Victoria Regina are so large that, by placing boards on them and a chair, they have held up an ordinary woman. In March they have the finest display of Cinerarias that I have ever beheld and the Calceolarias, a little later, are equally as fine.

Perhaps neither Mr. Phipps nor any of his friends have ever been able to measure what seems like an immeasurable influence for good that this bestowment has been to hundreds of thousands of the people of that city. It is not only interesting, but bordering on the pathetic, to watch the holy influence of the flowers and plants, as mute messengers of Heaven, alike on childhood, youth and age; on the poor as well as the rich; on the illiterate foreigner as effectually as on the American man of letters. One of the "wings" of the conservatory is occupied with Cacti. Photo 147 is a glimpse from one end of this department.

Quite a number of varieties can be seen in the photo. The one called by some "the cushion Cactus" is noticeable. However, as far as I can gather, every man prefers that "the other fellow" shall make the test as to whether it is a comfortable seat before he "makes the venture." It is really a wonder that the Cactus is not more generally grown as a house plant, when one considers the inexpressible beauty of many of their flowers.

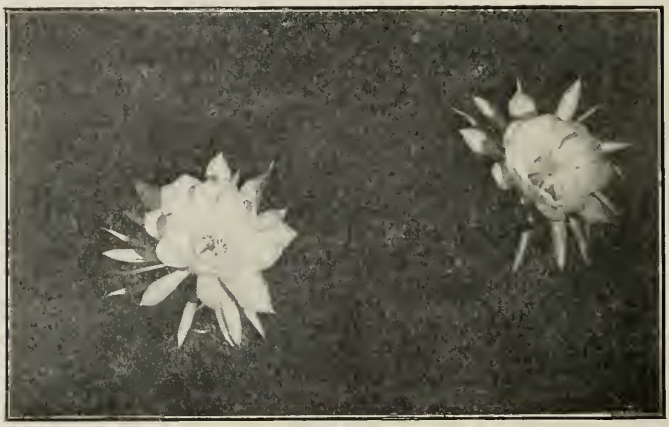

Photo 148

Flowers of the Night-blooming Cereus.

Probably no plant excites more interest than those commonly known as the Night-blooming Cereus. Nothing equals the exquisite beauty of these nocturnal visitors in all the delicate, wax-like structure of its flower, with fragrance unsurpassed. The flat-leaved variety commonly called "Night-blooming Cereus" is a Phyllocactus. The flowers of one of these are shown in Photo 148. This picture was taken about ten o'clock at night by the aid of a common lamp, with fifteen minutes' exposure. The plant was photographed the following day as shown in number 149, on the lady's lap. It seems strange that more of these wonderful, desert plants are not adopted by the people.

There was a remarkable coincidence in connection with this "night-bloomer," a few years ago. I was twelve miles from

home one night (17th of September, I think) and the whole community was interested over the blooming of one of those shown in the two accompanying photos. It was a large plant and had seventeen flowers in all. On our way we passed a house where there was a "slip," a year old, from the one we were going to see; this, also, had two fine expanded flowers. The following week the papers reported that Mrs. ——— called in the neigh-

Photo 149

Plant which Bore Flowers shown in Photo 148.

bors to see the glory of her Night-blooming Cereus which had eleven flowers, (on the same night as the two above described,) and a Cleveland paper reported the blooming of a very large one in Bedford, (O.) the same night. About a month after, passing a house eight miles from home and seeing one of these plants, a very large one, the lady remarked, "You should have seen it when in bloom." Tracing back to the date, it seemed to be the

same as the others, or the night after. This coincidence might have just "happened," but it is worthy of consideration by lovers of these strange plants.

It is a known fact that the Cactus will stand a good deal of "hard usage," but it does not follow that it is wise to neglect or abuse them. Good drainage and light soil is what they need; soil that is composed of rotted sods, sand and leaf-mould. There is nothing easier grown, or prettier for winter than what is known as the "Crab Cactus," especially when grafted into a stronger grower.

Photo 150, Pruning Altheas.

Among the interesting flowering shrubs are the "Altheas," so-called. But few plants are easier to grow. In regions where the "changes" are extreme they sometimes "winter-kill." A little protection, as suggested for the Rhododendrons, might avert trouble. It is known that with their rapid growing tendencies, and "crotched" joints they have a strong tendency to split. In the eastern states, a method of pruning back has come into favor as shown in Photo 150. This is done in winter or early spring, and from the one or two eyes left on each branch strong flower shoots are developed, resulting in the compact flower display, shown in 151.

Photo 151
Result of Pruning Altheas Severely.

Photo 152
Ornamental Effect of Grasses.

A very fine effect is produced by the use of the ornamental Grasses. The triangle, shown in Photo 152, is quite striking. In the center is Arundo Donax, commonly called the "Corn-plant." It is supposed by some to be the "reed shaken by the wind," of Scripture. On the outside is the fine-cut Eulalia Gracilis.

Of course you cannot afford to leave out of your collection the hardy Hydrangea shown in Photo 153. Of all the hardy

Photo 153

Hardy Hydrangeas are Effective.

shrubs, not one is such a prolific bloomer, and not one holds its flower so long. Some plants, like certain songs, "are here to stay;" Hydrangea Paniculata Grandiflora is one of them. To get the best results from the Hydrangea, attend to the drainage, dig deep, give good soil and prune somewhat severely. First cut out one-half of the weaker branches entirely—clear back to the older wood. Then clip back the remainder about one-third of their length. This gives you less flowers in number, but

makes up in size, as shown in Photo 153. Bushes of this plant that are not sufficiently pruned will have a great many flowers, but small; when by severe pruning they would be as big as one's hat.

THE CHRYSANTHEMUM.

Among the charming fall flowers that I remember in boyhood's days—in Old England—was the Chrysanthemum; but to see one measuring more than three inches in diameter was a wonder. Mr. David McFarlane (Photo 157) showed me a specimen last fall measuring twenty-three inches. The improvements that have been made are infallibly prophetic that there are great possibilities ahead; "improvements," perhaps, of such superior character, of which the mind has scarcely dreamed. The Chrysanthemum, alone, would be a "witness" to this fact.

In Photo 154 you have a view, to the left, of the "bush-grown" Chrysanthemum that took the prize at the flower-show, at Tarrytown, N. Y. This is a partial view of the Chrysanthemum-house at Mr. Wm. Rockefeller's, Rockwood Hall. You

Photo 154

Prize winner, Flower Show, Tarrytown, N. Y.

Photo 155

Chrysanthemums grown at Wm. Rockefeller's, Tarrytown, N. Y.

will notice how they grade back—in height—to the right. The tallest are seen in Photo 155. Mr. Middleton, the chief gardener and florist, is seen among the plants. He is standing on a three-foot step-ladder; some of the plants were twelve feet high. Mr. Middleton is a Scotchman, and like most of the old-country-trained men, he is thoroughness to perfection. People remark, "Oh, well, at Rockefeller's and such places, where they have everything to do with, this is easy." It is true there are great advantages at places where houses are especially constructed, and there is "everything to do with;" nevertheless, it is also true that all the facilities in existence will not produce the results if you have not "the right man behind the gun." As previously remarked, America is woefully lame in that there is no system of drilling the boys in a manner to turn out first-class "workmen" in these particular lines. Now and then a lad with innate love of the profession has come to the front. Of course, the country is "young," but we are certainly "old" enough to

commence a systematic training of gardeners, florists and practical foresters. Let this be thoroughly agitated.

A Chrysanthemum nine feet in diameter is said to have recently taken the prize at the flower-show in Chicago. In Photo 156 there is a partial view of one eleven feet in diameter! This was grown by Mr. David McFarlane (seen also in Photo 157), at Mr. Emil Berholzheimer's, Tarrytown, N. Y. The plant was too large to be taken out of the greenhouse, so that it was not

Photo 156

Eleven Feet in Diameter.

exhibited at the flower-show. Mr. McFarlane, also, is a Scotchman, and in him I have a hearty co-worker for the protection of roots. He fully understands the destruction befalling millions of plants, annually, through lack of knowledge on this vital point. The reason he had such fine success with the specimen in Photo 156 was that, after the final "shift" into the pot in which it was to be "flowered," he plunged the flower pot into the midst of a tub of sand. If florists who have to battle with so much "mildew" on the leaves of their "Mums" would "plunge" their

pots, the feeders would not perish, as they often do, affecting the foliage and laying the foundation for fungoid diseases.

A very few suggestions will aid the amateur. Assuming that you have a healthy plant, in the fall, as soon as the flowers are gone, cut the wood off down close to the ball of earth. Sink the crock in the ground in some sheltered place. Cover to keep from hard freezing. In the spring lift the crock and place it where it will start to grow, (the kitchen window is a good place.) The young growth will start as thick as grass. Pull off a few of the strongest and put them in moist sand. They "root" in a short time. Place them first into two-inch pots. "Shift" every two weeks, from two to three-inch pots, three to four, four to five, five to six, six to eight. Keep them "plunged" all the while either in the ground or a box of sand. Toward fall stand them in an organ box with top and front off, ("plunged" of course.) On cold nights throw canvass or old carpet over, and you will have "Mums" till nearly Christmas.

Photo 157
Chrysanthemum measuring Twenty-three Inches.

Photo 158, In perfect Health.

THE CAUSE OF FAILURE.

The failure of millions of people in the United States to successfully grow plants and flowers—also trees— arises, not from a lack of interest or a willingness to spend money, but from lamentably defective education. They see trees, wild shrubs and flowers growing freely and blooming in abundance; they know that all these have tops and roots, and that—in some way—by the action of the rain and sunshine, they produce the charming results which they are permitted to behold. So lacking are these people in education that they seem to imagine that all they have to do is to stir the soil, drop in a few seeds and that nature will do the rest. "Nature" may be fully depended on, and if there happens to be a big, plump Burdock seed alongside of the Pansy seed that you have planted, Nature lends her aid to both; she is "no respector of persons"—or seeds—but the Dock being the easiest to germinate, the more vigorous and hardy, "gets the

start," and the slower and frailer Pansy has "no show," and succumbs to "the survival of the fittest." Good people, remember that all our cultivated flowers, vegetables, fruits, and many shrubs and trees are the production of years, and some of centuries, which have evoluted them, bringing them from the lower to the higher forms of productiveness, both in bloom and fruit.

Photo 159, A graceful Tree.

But, almost universally, the improvement of the flower or the fruit is accompanied with a proportionate weakening of the plant. This is illustrated with the Coleus. The larger the leaf and richer the coloring, the weaker the plant; hence, many of them cannot be used for bedding, because they will not stand the sun. This principle is shown, also, in the improvement of man. Take the college professor and put him out in the wigwam and let him secure his living from roots, nuts, etc. Could he hold his own with the Indian? No, he would perish. Shall we, therefore, go back to the hardier life of the aborigine? Nay,

but let us adapt the surroundings to the advanced conditions both for human and plant life.

The principal object of these pages on "Better Flowers" is to show you, first: that you must get rid of the surplus water—by drainage. Second: feed the plant. Third: care for and protect the root. You will get your "crop" of flowers or fruit as a reward for "services rendered."

Photo 160

Poor Taste in Terracing.

Having now given you the "key" you can unlock the storehouse of Nature's inexhaustible supply. If you ignore the fundamental principles underlying the success with all plant-life, you would do better to give the money that you spend for seeds and plants to the Salvation Army, and save yourself the annoyance of failure; but you will try, will you not? I would suggest that you experiment with some of the commonest plants.

You will probably want Mignonette. These will not transplant. Take a few small flower-pots, fill with earth, press down gently; drop in four or five seeds, lightly cover with sand. They grow readily. Don't let the earth dry out; keep the pots

"plunged" in a box of sand. After the frost is over, plant out. This you do by placing the fingers of the left hand on the ball of earth, give the crock a light tap and the contents easily comes out. Sweet Alyssum, Candytuft, Chinese Pinks, Phlox Drummondii, and almost any plants can be "forwarded" two or three weeks in this way, or you can wait later and plant all in the open ground. The Zinnias are superb for cut flowers. The Balsams are very easy to grow and nothing is more free-blooming. Geraniums, Heliotropes, Lantanas, Feverfews and double Petunias are more satisfactory if you procure the plant, as the season is too short when grown from seed. The single Petunia, however, makes a ready growth from seed, and gives healthier plants. Verbenas and Salvia Splendens do best from seed, but should be started early—indoors—the latter part of February or the beginning of March.

In order to succeed in anything one must "know how." Good reader, by the use of the camera, and by the simplest explanations, I have endeavored to make the subject plain. Now if you want flowers (presuming that you "know how") I will give five rules that will insure success. First, work; second, watch; third, work; fourth, work; fifth, **Work!**

You can learn the character, habits and merits of all plants from the Florists' Catalogs, Magazines, Horticultural Papers or other descriptive works.

CHAPTER V

LANDSCAPING, "STIFF" AND "FREE"—LESSONS FOR SMALL HOMES—LESSONS ON A LARGE SCALE FROM THE WILLIAM ROCKEFELLER ESTATE, AND OTHERS—THE USE OF VINES AND HOW TO GROW THEM—ORNAMENTAL PRUNING—FUTURE FORESTRY—A LUMBER FAMINE—TWENTY FORMULAS FOR THE DESTRUCTION OF "SCALE," INSECTS AND FUNGUS.

LANDSCAPING.

Almost everything is liable to run into "fads" and go to extremes. Thirty years ago much was said and written about "Terracing," and quite a few people thought "to be in the fashion" they must have the lawn "terraced." As to whether it is desirable or not depends upon elevation, depth of lawn, etc. There are places where the raise is abrupt with but little depth of front; here the "terrace" is the only plan. The work shown in Photo 160 was of very poor taste and a needless expense. It is a neat, well-built house, but on the highest point of a hill and the cellar wall is two feet higher than it need have been. In order to build a narrow plateau in front they dug away the earth in the lawn below. The way that the work was done makes it very difficult to take care of the embankment. Then, the "stiffness" of the whole arrangement is utterly objectionable unless in some country place where nothing but natural scenery was ever looked upon; and even then a person would soon tire of it. The planting, also, has the same "stiffness." There are two cut-leaf Birch, two Irish Juniper, and two and two of a number of shrubs.

On the other hand, the "spirit-level lawn" is just as objectionable to the eye, and an uniform inclined plane is not much better. But the great misfortune is, men drift from the cob-

bler's bench, tin shop, the ditch or any other vocation and pose as "landscapers." Photo 161 shows a grade that (on a small scale) always attracts attention. The gentleman who built this carefully figured all the elevations, and by the time the cellar dirt was disposed of there was but very little hauling needed to

Photo 161

Pleasing to the Eye and Easily Cared for.

complete the lawn. This is not only graceful to the eye but also very easy to mow and otherwise care for.

In the picture presented in Photo 161 you have a fine, "open lawn center." The shrubbery is forced back to the sides and into nooks and corners.

Looking at Photo 162 there is something bare and unattractive at the first sight, and everything looks out of proportion.

Photo 162
Bare and Unattractive May First.

Photo 163
Transformed in Nine Weeks.

This photo was taken the first week in May and the lawn was said to be "graded." Nine weeks afterward, it appeared as seen in Photo 163; quite a transformation. Here was a case where a terrace had to be used to get any space at all on which one could comfortably stand in front of the house. But you will notice that in forming the embankment all sharp points were avoided, and there is an ease about it, wherever you look.

Photo 164

Five weeks after Photo 163

Notice, also, the effect of the vines. Instead of looking on a great, lifeless, angular object, the eye glides from the soft green of the grass to the variety of life in the vines. See this same front taken again five weeks later, in Photo 164. In 169, you see the right-hand panel of the railing as it appears still five weeks later. See, also, the huge Caladium Esculentum growing in the old hollow logs—to the left. If you step to the right —up around the house—and look around the corner down to-

ward the front, this is what you see, as presented in Photo 165. What a charm! What is home without a vine? "Yes, but 'too much expense for a poor man,'" do you say? No, not at all! How much do you suppose the whole cost was? Two Caladium bulbs, twenty-five cents each; eight packets of seed, five cents each. There are thousands of common laborers who

Photo 165

At the Side of the House.

spend more than that every week for tobacco—to burn—for their own pleasure, while the humble little abode—that might be converted into a "home"—goes as lifeless and desolate outside as the souls are within. How long it takes people to learn that to miss heaven here is to miss it for eternity!

In every land and every clime
Adorn your "home" with shrub and vine.

One of the ever-fascinating charms of life comes from the almost infinite variety of forms with which we are brought in contact. Take, for example, the size and form of the leaves and flowers of the vines surrounding the house now under consideration. In ninety days from time of planting, the heavy vines

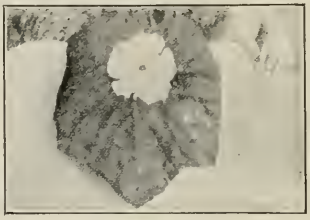

Photo 166

Leaf and Flower of Hercules' Club Vine.

seen in Photo 164 (or at the time when 169 was taken) had grown thirty feet, and hung with the odd and attractive gourds (the Hercules Club variety.) as seen in that picture. The leaf and the flower of this wonderful vine are seen in Photo 166. Beside this coarse—but beautiful—leaf is held a leaf of the charming Cypress vine. The leaves and flowers of the Cypress can be seen, also, in Photo 167. The Cypress was growing on

Photo 167

Leaves and Flowers of Cypress Vine.

the side of the house shown in Photo 165, next to the gourd vines. Then came the Balloon vine, while on the old stump of a tree were the variegated Hops, and over the kitchen was a rank growth of Morning Glories. The "vines" seem to disappear in proportion as "homes" give way to tenantry. The charm of

vines, on the houses of rich or poor, can be seen in the series of photos from 103 to 114, inclusive. The last one named, how-

Photo 168

An Abundance of Pansies.

ever, (114) should teach a lesson of warning. If allowed to "hug" the trees in this way, and climb all over them, as they ultimately will, it will be the death of the tree. (In England they have to make a fight, in the woodlands, to keep down the Eng-

Photo 169

Right hand Panel of Porch.

lish Ivy.) Boston Ivy is the best vine in America for brick or stone houses. See it in Photos 103 and 106. On the church in

Sewickley, Pa., there are two kinds (Photo 109); the Boston Ivy on the end of the church and lower part of the tower, while the upper part of the tower has the more loose-growing Virginia Creeper, or "American Ivy." More of the Japanese Clematis, (Paniculata) shown in Photo 108 should be planted for trellises, fences, rock-work, etc. This particular specimen was cut off, in spring, down to where Captain Reno is pointing with the umbrella.

Phto 170
Red Clover is Rank.

In landscaping the first consideration should be the preservation of trees, if there are any on the premises. Remember, root protection is what you must insist on. If you have purchased a property having large trees and you intend to build on it because the trees are there, don't let a man destroy them because he calls himself a "Landscape architect." Large trees may be either raised or lowered, and done in a way to improve the growth of the tree, though it may be quite an expense to do it. But if you are fifty years old and you have purchased prop-

erty with trees of the same age, you cannot afford to have them destroyed and to start in with having a planting of young ones.

The next thing is the procuring of a good, strong sod. It is very essential to have the lawn clean. There is but one way to do this, i. e., fix the grade and then let it lie, if you do the filling in the spring, working over the whole surface every two weeks, all summer; by the tenth of September you will have killed nearly every weed, and seed sown at this time is almost sure to "catch," and will become established before the heavy freezing, and a fine, clean lawn will follow the next spring. Or you can fill in and get grade in place in the fall, and let be over

Photo 171, Timothy is Coarse.

winter. It will come up thick with weeds in the spring. Hoe or cultivate all over as soon as dry enough. Rake off and let it be another ten days. Hoe and cultivate again, then rake off and sow seed.

The kind of grass seed is of considerable importance. Timothy is always a "sure catch," but it is coarse, and should be used sparingly, if at all. The character of the plant can be seen to the right—in Photo 171. The bunch to the left is Kentucky blue grass which is considered the best "all round" grass that can be used on a lawn, though there are finer kinds. Don't use Red Clover; it is too rank a grower for lawn purposes, as shown in Photo 170. A bunch of the White Clover is shown on the left in that picture; it is a fine variety for lawn purposes.

ORNAMENTAL TRIMMING.

"From one extreme to the other" is the way of the world. A quarter of a century ago all went to "trimming" into ornamental forms. Now some landscapers are preaching "under no consideration have a shorn tree; copy after Nature and Nature alone." This extreme is better than the other, but instead of an extreme in anything, it is wiser to use good judgment. Is there anything beautiful in the "natural appearance" of the Irish Juniper, with its half-dead, ragged top, in Photo 174? All that dead center could even now be taken out and, by the use of a couple of bits of copper wire, the base could be drawn in and fastened into a neat pyramidal form; any objection? To the right and left of the entrance to the burial lot, seen in Photo 173, are two shorn Norway Spruces. They were cut back and "trimmed" in August, 1881. At that time, (before cutting,) they were the same size as the tall Spruce in the rear. The annual pruning cuts away the new growth and stunts the roots

Photo 172
Leaves of Virginia Creeper, Hop, Boston Ivy, Poison Ivy and Plantain.

Photo 173, Shorn Norway Spruces.

in proportion to the foliage removed. The shorn hedge, in that picture, was cut down the same time as the two Spruces, and has been held practically at the same height ever since.

As to whether the "ornamental" be adopted depends on location. To adopt the use of ornamental trees in a city lawn would be inexcusable if not reprehensible. In a city everything is artificial; hence all planting should be natural. Reverse the order; go out ten miles from a city, and see nothing but weeds, elderberry and blackberry bushes and it is a relief to come upon a place where an occasional shorn tree or bush breaks the monotony. See the charming effect at Mr. Whetherlee's, Orienta Point, N. Y., in Photo 134.

Photo 174

There is no Beauty in Half Dead Trees.

Shorn and trained trees are always in good taste in a country cemetery, but not in a city cemetery. The Streetsboro, (O.) cemetery was "landscaped" and many of the young Arbor Vita, Spruce and Hemlock trees put under training eighteen years ago, and, since that, it has been the admiration of people from both country and city.

Every child should know vines at sight. In Photo 172, at the upper left-hand corner, is a leaf of the Ampelopsis Quinquefolia (Virginia Creeper), five lobes to the leaf. To the right of that is a variegated Hop leaf, in form much like the Maple. Few people seem to know the beauty of this vine, and most of those who do try to grow it nearly starve it to death. Vines, in general, may be treated like foliage plants—**heavily fed.** Ampelopsis Veitchii (Boston Ivy) seems to thrive where nothing else will, and nothing will cover a wall so completely, (see the house in Photo 135.) The leaf of the Boston Ivy is seen in the middle of the panel, Photo 172. See how different in form the "American Ivy," to the left, above it. The "poison Ivy" should be

avoided; you can tell it by the leaf—in the lower left-hand corner. In certain localities it will run all over the ground. Some cannot handle it; and others are so susceptible to its virus that the wind blowing from it will poison them. Nature, however, supplies the antidote, the common "Plantain"—lower right hand corner, growing nearly everywhere. Steep this plant—green or dry—and use the "wash" freely and the poison will disappear.

THE PANSY.

No home seems complete without the Pansy, and they work into the landscape admirably, blooming early in spring and late in fall. No plant seems to have been more misunderstood. Nearly all seed catalogues say, "plant the Pansy in partial shade." This is erroneous advice. Turn to "Primer on Trees and Birds," page 112, and see a row of white Pansies three hundred feet in length—like a snow bank in the blazing hot sun, the middle of July. See also Photo 115 in the same book, and learn the lesson these photos teach. The Pansy is as hardy as wheat, and may be sown in the early part of September and

Photo 175. Intelligent Landscaping.

"wintered over," protected lightly after the ground is frozen; or the seed may be sown indoors in January and planted out in spring. How nice when flowers are scarce to have an abundance of Pansies! (Photo 168.)

LANDSCAPING—THE "FREE" OR NATURAL SYSTEM.

To speak of landscaping as a "system" does not seem right, there is no "system" in producing best results. The successful landscaper, like the poet, is born, not made. It requires not an imitative but a creative mind. It is only on comparatively large grounds that the genius of the landscaper can be displayed to perfection, though his services are invaluable on the smaller estates. Take for example Photo 175, (at Miss Robinson's, I think, Orienta, N. Y.) There is a gentle slope, an ease, about the grade of the lawn. Then one tree in front of the house has been pruned to give a nice vista from within. The ignorant "Tree butcher" would have slashed off the lower branches of the

Photo 176

On spacious Grounds of Gen. Carroll, Tarrytown, N. Y.

towering, beautiful "Lime Tree," but someone with good sense said, "Woodman, spare that tree!" To have removed the lower branches of that majestic tree would have inflicted a damage on that property that it would have taken a half century to repair. Then, to the right, away back, is a shorn Evergreen, just enough to bring out contrast.

Now look at Photo 176. This is landscaping on a larger scale. It is one of the many charming views on the spacious grounds of Gen. Carroll, Tarrytown, N. Y. The superb effect produced here is not the work of an imitative mind, but thoroughly creative (would be pleased to "give credit" if I knew who executed the splendid work.) Look at all the little nooks and recesses, and the apparent, persistent attempts of old Mother Nature to close in on that open space. To the left are the few advancing Evergreens, as if they were leading the way of an army that had been in ambush. Wherever the eye turns there is inspiration to the soul and rest to the brain. Do we wonder that people of "means" gravitate from the teeming cities to such

Photo 177

Rear of Rockwood Hall, Wm. Rockefeller's Home.

sights of rest and beauty? Some of the most refining, moralizing and spiritualizing influences are arising from the rural homes of city people. It is this class of citizens who, having saved a little money, will be among the first in the enterprise of Restoration of the Forests.

ROCKWOOD HALL.

With an experience in Great Britain and also in this country, and with so many years of observation, I confess I have never seen an estate that for compactness without stiffness, im-

Photo 178

Vegetable Garden, Rockwood Hall.

provements without artificiality and extent of variety that surpasses Rockwood Hall, Mr. Wm. Rockefeller's summer residence at Tarrytown, N. Y. The rear of this beautiful mansion is seen in Photo 177. This faces easterly. The front faces westerly and overlooks the Hudson River, some three miles wide at this point. The view down the river I judge is about

fifteen miles, and it must be twelve or more up stream. Away across the river are the fascinating "Palisades." In among the trees and undulating surface, on the easterly side, are the coach barn and extensive greenhouses and conservatories. Then beyond the greenhouses, looking down over the narrow but fertile valley is the vegetable garden, seen in Photo 178. The trees seen beyond the garden overhang Broadway, the finely macadamized street which is "Broadway" in New York and "Broad-

Photo 179

The Sheep are Cared for by a Shepherd.

way" in Albany. The charming woodlands seen rising beyond are a part of Mr. Rockefeller's estate, about seven hundred acres in all, I think. A great part of this is native woodland, much of which could not be cultivated. The "grounds," however, that surround the house and extend to the woodlands are quite extensive. A fine flock of Southdown sheep add a naturalness to the rural aspect, as can be seen in Photo 179. There are no fences, but the sheep are cared for by a shepherd who has two remarkably intelligent shepherd dogs. In the last-named photo is seen a tall Hickory tree with two of our men in the top. This is the tree shown in Photo 53. It is worth turning back to

Photo 180

Mr. B. M. Hawks, Superintendent Rockwood Estate.

that, as it will give the reason why it was deemed advisable to cut back the top. You will notice how the base was weakened; the wind, having such a leverage, might snap it off; so that the extreme tips, just above the men's heads were taken off, wounds dressed and "capped." It was also given "root treatment" to stimulate new growth.

Photo 181 is another fall view of these grounds. Scores of equally charming scenes might be taken on the place. Indeed, if you set a camera anywhere and close your eyes and snap the shutter you procure a good picture. Turning back to the "autumn" scene, you can get some idea of the fascinating woodland scenes on this estate. The drives wind around, down the glens, with rustic bridges across laughing brooklets; on, on down to the embankment beneath which is the New York Central R. R., skirting the edge of the Hudson River. On you go, amid huge rocks, thousands of wild Rhododendrons, in among the trees, out into the sheep pasture, hid again among

shrubbery, out into a meadow with a herd of prime Jersey cows, watched by a herdsman (there are no fences.) On you drive among the ever-changing scenery, and everywhere you go there is the same absence of "stiffness" as you see in Photo 182. The gentleman in the buggy is Mr. B. M. Hawks, superintendent of the Rockwood Hall estate. If you desire a better acquaintance with him you may study him from Photo 180. This gentleman, though not a "professional" is a natural landscaper. So is Mr. Rockefeller. Either of them could have been a "success" at this "calling," far excelling many professionals who follow it "for revenue only." America certainly has many genuine "landscape architects," gentlemen who cannot be excelled in the profession; she has, also, those who are in it for money, as proven "by their works." In addition to a lack of natural taste, their business seems to be that of running up large bills by un-

Photo 181

Autumn Scene on Rockefeller Grounds.

necessary excavations, making heavy "fillings" and destroying trees thereby, and then crowding in "nursery stock"—ten to one more than is necessary—with all the "scale" and other diseases thrown in.

Photo 182
Driving over the Estate.

FRIEND OR FOE.

Much appears—in certain papers—about the "millionaire," and he is spoken of as "the foe of Labor." Some years ago, when my attention was called to "the gulf between capital and labor," I was led to believe that a man who is said to be a "millionaire" actually possesses that many dollars in cash. Later and closer attention to the matter revealed that a "millionaire," so-called, might be really "hard up" for cash; that his "holdings" may be only "stocks" estimated to be worth that amount. Suppose, for example, that the "millions" are based on the esti-

mated value of rolling mill property, and suppose that a "panic," like that of 1873-4-5, happens, where are the million dollars? They are not; and the reputed "rich man" may not have bread in the house for his family, as I knew a case in 1875.

Let's take two men starting with equal chances in any business, oil business, if you like. A is a good man, a close figurer,

Photo 183

The Washington Rock, Mamaroneck, N. Y.

hard worker, but his evenings are spent in the bar-room. He finally strikes a "gusher," said to be worth twenty-five thousand dollars. He now "moves" in "higher society," and champagne takes the place of beer, and cards suit him better than the dullness of home life. He makes up his mind to "show the world a thing or two;" he will get rich quick. "Poker?" Yes, sir! he stakes the price of his "gusher." The "hand" is shown: fortune gone. Where are his "friends?" yes, where? He "goes to the dogs" and, finally, the county buries him, for the same reason that the Irishman gave: "Ef they don't bury me for love, they will for stank."

B, on the other hand, may represent Wm. Rockefeller or any other successful man. Born poor, had the "honor of working for a living;" invested a few dollars in "oil;" saved the pennies; rode horse-back through rain, sleet and snow; brought men together and formed a company; put in pipe lines; constructed refineries; brought down the price of oil; made money; spent money in building a splendid house; laid out spacious grounds; purchased horses, carriages, automobiles and made miles of new and first-class roads. "Friend" or "foe" of labor, which?

FUTURE FORESTRY.

The "Father of our country" evidently knew something of the uses of gun-powder, and a spiritualist might be inclined to think that his disembodied spirit was present at the blasting of the rock at Mamaroneck, N. Y., on the road that turns down to Orienta Point, where the face of Washington was left—almost

Photo 184, Native Woodlands.

to perfection—when viewed from a particular spot. Not a chisel or other tool has ever touched it; it is just as seen in Photo 183, and is known as "The Washington Rock." With the memory of George Washington is associated the memory of the American native forest, and one can imagine the anguish of soul endured by those still with us who spent their childhood's early days in the woodlands which then stood in all their pristine glory, but have now passed away. I came, myself, early enough (1873) to see much of the grandeur of Ohio's charming forests, but nearly all have fallen before the woodman's ruthless ax. We all, of course, understand that the clearing away of much of the woodlands was a necessity, but the wholesale destruction was utterly inexcusable. As illustrative of the wrongs: not many years ago, an enterprising Dutchman "made a payment" of fifteen hundred dollars on a five thousand dollar farm, sold the timber for three thousand dollars, took to drinking, spent the money and let the farm "go back" to the former owners, minus one-half its value. He might just as consistently have stolen and carted off one-half the farm.

Another case was that of a somewhat "fast" man who fell heir to a hundred acres of land and, being pressed for money, sold a piece of timber worth at least two thousand dollars for five hundred dollars, and the "old homestead," with buildings tumbling down, was let go to wreck because the vanities of a spendthrift son must needs be gratified.

Only a short time ago I walked for hours in the bit of purely native woodland seen in Photo 184, and felt like praying for its preservation, but prayer seems like a mockery when the crossmark is on the tree and the "heir" must needs get money! Was "Liberty" conferred for no higher purpose than gratification?

In circular number 33 of the United States Department of Agriculture, giving the substance of the proceedings of that memorable American Forest Congress, held in Washington, D. C., January 3-6, 1905, in discussing the evils of sheep pasturing in the woodlands of the West, it was shown that the animals ate the young seedlings and thus prevented new trees forming a forest growth. One point was entirely overlooked or, at any rate, does not appear in the circular; namely, that by keeping down the young growth, the grass "gets a start" and the death

of the tree speedily follows. This has been pointed out in the earlier part of this work. In about all the thinned-out woodlands through the country, trees are dying and the people do not know the cause. There are places now in the city of Pittsburg, Pa., which but a few years ago were fine examples of the primeval forest. Owners of such property thinned out the trees so that grass might grow and look more lawn-like, so as

Photo 185

Dying because of Luxuriant Growth of Grass.

to sell more readily as residence building lots. Now the trees are dying as seen in Photo 185. Where trees begin to "go back" in this way in the forest, harvest them at once; for just as soon as death sets in decay follows, and it becomes the breeding place for every kind of borer, beetle and grub, and the timber is soon unfit for marketable purposes. Such trees, however, can be preserved as shade trees and, with proper care, will make a new growth over the old and injured parts. Remember that your lawn and fruit trees should be kept clean. The old loose

bark should be rubbed off with an old curry-comb, a good employment for children (Photo 186.) The Elms, seen in Photo 191, have been thoroughly cleaned and were treated to the "lime, sulphur and salt" formula, for the destruction of insects. A full list of formulas for destroying insect pests is given in the

Photo 186

Rubbing off Old, Loose Bark.

last pages of this work, reproduced from one of the bulletins of the Ohio Experiment Station.

The "woodsman" has not been the only destroyer of trees. The average "sportsman" and the boy with the "Flobert Rifle," unintentionally, have been their enemy, by killing their protectors, the birds. Should the increase of the Web-worm continue

in the same ratio for the coming ten years that it has in the past five, it is a grave question if practically all the trees of Ohio will not be destroyed. I speak of Ohio because here, in the greater absence of woodlands, the "homes" of birds (the trees, vines and bushes) are lacking and, consequently, the increase of the destructive pest is greater.

I was passing, five years ago, and saw a "nest" of those worms on the tree at the rear of the buggy seen in Photo 187. I had a strong impulse to get out and set fire to them, but I neglected a duty. A year after the tree was defoliated and, passing there last fall, I discovered that the trees in the whole neighborhood were leafless. They (the worms) are now all over the country, and playing sad havoc with the forests. No tree can long survive without its foliage. In the east they tell me that the stripping of the elms, by the elm-leaf beetle, five years in succession, kills the tree. Last October I went from Pittsburg, Pa., to Marietta, O., on the B. & O. R. R. and it was almost heart-rending to see the destruction of trees by this web-worm. Almost every Hickory and Walnut tree for the whole distance

Photo 187

The Work of the Web-worm.

Photo 188

The Canker-worm has Attacked the Tree.

had been defoliated and covered with nests, as seen on the tree in front of the horse, in Photo 187, and thousands of trees were standing dead, killed by the repeated attacks of this foe. It is spreading rapidly also in Pennsylvania, New Jersey, New York and all the eastern states that I have visited. The work of the canker worm is seen in Photo 188. In May and June, 1905, at Sewickley, Pa., they destroyed the foliage of trees in miles of woodlands. These "judgments" are befalling us as punishments for our ignorance in destroying the native birds. This matter is discussed in full in "A New Era in Tree Growing," showing what must be done to remedy the trouble.

A LUMBER FAMINE.

Some two years ago an eminent French authority gave the reason for the approach of a "lumber famine" for the whole world. The substance of his reasons were about as follows:

Europe, Asia and a part of Africa are using more lumber than they are producing, and even Mexico is consuming one hundred times more than she produces; that Siberia and South America have large areas of forests, but they are too far from the sea-board to be exploited with profit; and that the United States and Canada are the only two countries that have any considerable hard wood for the world's market.

Photo 189

"Under the Spreading Chestnut Tree."

Following our reports of the States, it seems that for every two acres we are destroying we are planting one tree! Canada will have "wood to burn" when we are treeless; for they seem to take in the situation and practice conservation. Let the mind go back, say two hundred years. Picture to yourself those beautiful New England hills covered with Pine, Spruce and Hemlock. Imagine yourself in a modern flying machine, sailing westward. You go into ecstasies over the sublime, towering Pines on the hills and mountains of New York and Pennsylvania. Your soul is thrilled at the sight of the giant Oaks,

Walnuts, Liriodendrons, Maples, Beeches and all the common "hard woods" on the level portions of New York, New Jersey, Pennsylvania and practically all of Ohio, Kentucky and Indiana; and if you were a Methodist you would feel like singing "Glory to God," as you hear His praises sung by the winds in the vast

Photo 190

Living among the Trees.

pineries of Michigan. As you witnessed the destruction by "slashing" and "logging" and ventured the remark "this waste is wrong, sirs," you would receive the jeers of ninety-nine, and the wise remark from the hundredth, "an abundant, inexhaustible supply, sir; **utterly inexhaustible!**" But to-day, where are the glorious Pines and majestic hardwoods? **Gone!** Nevermore to be seen by mortal eyes!

The Gulf States still have large areas of Pine, but those who are watching the denudation say that, in twenty years, those pineries will be practically destroyed, and that at the

Photo 191

Elms cleaned of old Bark.

present rate of destruction the Redwoods and Coniferas of the great Pacific slope will be swept away in fifty years. Not one out of a hundred, if one out of a thousand, seem to realize the gravity of the situation. They know the price of lumber is "going up." It seems that the great lumber companies have competed so violently that they have kept the wholesale price down. Though lumber is growing scarcer all the time, our facilities for hauling from the South or West are such that the country will not wake up to the destruction of the forests until the end, and the report comes back, "no more!" One feels like sinking into the earth to even contemplate the end of the American forests, and yet this must come unless there is a general awakening, conservation practiced with what we have, and replanting commenced with vigor.

The Forest Congresses are throwing new life into those interested in the work, but I fear, from the report just referred

to (circular 33), that there may be wrong impressions by that body of noble men and women as to the real area of forests in existence in the United States. In the speech by Hon. Gifford Pinchot, he is quoted as saying: "It should be remembered by every forester, and every man interested in forestry, that the woodlands in farms are about three times as great in extent as all the national forest reserves." This remark was thrown out as an encouragement to all to conserve what they have and thus co-operate with the government and the great lumber companies. By the expression "woodlands in farms," has the gentleman reference to what would be listed as such in Ohio or any of these Eastern States?

Twenty years ago there were hundreds of pieces of "timber lots" in this region, pure, native woodlands, with gigantic specimens of the hard woods. From fifteen to ten years ago those same pieces of native forests resounded with the axe, buzz of the

Photo 192

Weeping Beech, Hill-and-Dale Farm, Mamaroneck, N. Y.

saw-mill and profanity of the average woodsman. To-day, for a radius of fifty miles, I do not know of that many acres of unbroken native forests all told. If a person, not acquainted with the real condition, were to drive through this region, he would suppose there were thousands upon thousands of acres; especially would he form the opinion in the summer and fall months

Photo 193

A Model Entrance Drive.

when the trees are in foliage. These are "culls" left, that the lumber men had no use for, and I suppose they are entered as "woodlands." I am traveling most of the time and have ridden on nearly all the railroads in Ohio, and I am safe in saying that, in this State, there is not one-tenth, and probably not a hundredth part of the timber in existence that there is supposed to be. What people imagine to be "woods," containing valuable timber, are nothing but "groves," with the "saw-timber" cut out

and now growing up to grass for pasturage, and thus destroying trees that would become fit for marketable lumber. Even the trees big enough for cross-ties are cut out and sold. I find a great many prominent gentlemen say "Pooh!" at this, and af-

Photo 194

Cutting away the Timber Dries up the Stream.

firm that there is "any God's quantity of good Oak trees in this country for fifty years to come." Mr. Grafton, Chief of the Signal Service of the Pennsylvania Railroad Company, knows better, and realizes the gravity of the situation, as do nearly all railroad men. If railroad "cross-ties" are so abundant as some would have us believe, why does Mr. E. H. Harriman order one

million ties from Japan, at fifty-five cents each, to use in the line that he is constructing in Mexico?

We are told that Japan has "vast areas of forests." How "vast" on an island scarcely visible on the map? With the modern equipment for destroying forests, and converting the trees into "lumber," how many years will the timber of Japan supply the market?

CONSUMPTION OF LUMBER BY THE RAILROADS.

In the report of the American Forest Congress, already quoted, is a part of the speech of Howard Elliott, President of the Northern Pacific Railway, from which I make the following extract: "The total annual consumption of cross-ties, for renewals only, by all the railroads of the United States, is at least one hundred million, to which add twenty million for additional tracks in yards and the construction of new railroads and the total is equivalent to more than four billion feet. The signifi-

Photo 195, Gingko Tree.

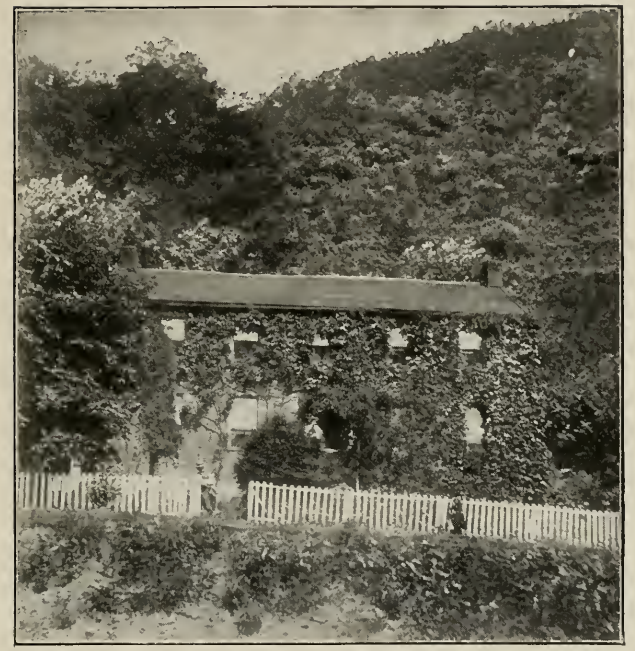

Photo 196, Among the Mountains.

cance of these figures is more apparent when it is remembered that two hundred ties are about the average yield per acre of forest, varying very greatly in different localities, so that to supply this single item necessitates the denudation annually of over one-half million acres of forest. But the cross-tie supply is only one of the forest products required by the railroads. There are bridge timbers, fence-posts, telegraph-poles, car materials and building timbers of all kinds, all of which, it is estimated, will nearly equal, in broad measure, the cross-tie item; so that it is probable that the railroads of the United States require annually, under present practices, the entire product of almost one million acres of forest." From the same pamphlet I quote from the speech of Mr. David T. Day, Chief of the Division of Mining and Mineral Resources, United States Geological Survey: "The miner has established his reputation as a good customer of the lumberman, and is daily becoming a better

Photo 197, A charming Vista.

one—For every ton of anthracite taken out of the mine, we must put back a cubic foot of timber—that is to say, seventy million cubic feet per year for the anthracite industry alone. Four million cubic feet a year will hardly suffice for the underground work in mines." These are only the "items" in railroading and mining. What about the millions of tons of "pulp" for paper-making and the uses of lumber in domestic and commercial life?

EUROPE WILL SUFFER FOR OUR SINS.

When I was a boy it was considered very fortunate to be the possessor of a few nice clean boards, a foot or so in length, as lumber was so scarce that every bit was commonly worked into some use by the carpenter who was trusted to handle it. Some rural districts had no timber that was permitted to be cut, but in the one in which I was raised, occasionally a tree was al-

lowed to be "harvested;" but the greatest of care was taken to dig down all around it, and far enough away so that the very last inch of timber—at the base—could be secured. England depended on the imported supply and probably does yet. The same, it appears, is substantially true of all the other civilized nations. The masses in those countries, like the masses in America, know that "the lumber comes from somewhere" and that is the extent of their thought on the subject. It is estimated that the forests of America have represented one-fourth of the commercial values of the country. Consider, also, what this "capital"—the forest trees—meant in the early days. About all a man needed was an axe, a blanket, a gun and ammunition, and he could go into the woods, build a home and fence a farm. He had his fuel and he had stove-wood to sell as soon as a community formed, and logs for the saw-mill to be converted into cash. These hundreds of millions of acres of timber are gone—one-half, may be two-thirds—wasted! Think of the billions of dollars "changing hands" in shipping, export-

Photo 198

Don't Plant Hedges under Trees.

ing, carpenter and cabinet work, and its uses in wagon and carriage building, etc. What has been true in America, in regard to the uses of timber, has also been true of other countries to which it has been exported. To the forests alone must be credited the marvelous progress and even the inventions of the last hundred and fifty years; and, unless re-forestration be com-

Photo 199, On the Hillside.

menced and prosecuted with energy, the "passing of the forests" means the retrogression of civilization.

"What are you giving us? We are only in the infancy of inventions! The mind of man is marvelous! As soon as one thing is exhausted, he discovers something else; we talk across the ocean and soon will be riding through the air; we'll need no trains or ships; besides, the bowels of the earth are full of coal and ore. Away with your 'calamity howling'; three cheers for progress and the human brain!" That sounds "loud," even for

Photo 200
A fine River Scene.

Photo 201
Mountain scenery from Allegheny River.

a "blusterbund." Sir, it seems as if you might be a descendant of the fellow who asked, "Is not this great Babylon which I have built?" As to the coal and ore supply, I prefer cool figuring to exulting declarations. I well remember the boasts of thousands, in 1873-4-5-6: "The pineries of Michigan are utterly inexhaustible!" They have not thought that way in that region for over ten years.

On the coal problem, an estimate was sent out in print recently by a conservative, scholarly scientist. Seventy-five years from now, he tells us, the coal beds of Europe will be practically exhausted. "What of that? we have a plenty." Sure of that? Enough for **your** time—may be, but is **your** time or **my** time what we have to live for? Our scientist tells us that the world is now using about eight hundred million tons of coal annually. Ask your coal man to tell you the number of cubic feet in a ton of average coal, then figure out the size of the little mountain of eight hundred million tons, and ask your preacher to "announce" how long before the coal trusts will notify the public: "Scarcity in coal; advance two dollars per ton over last year."

Photo 202

Overlooking the Ocean, Newport, R. I.

Photo 203, A peaceful River.

We are in the midst of the "Iron age," and ore is being used at a rate which very few comprehend. A recent writer (who seemed moderate in expression and a careful figurer) said that thirty-five years will make such inroads on our "paying" ore-beds that the price will be very high, and that fifty years from now iron will be almost prohibitive for many purposes; yet our "civilized" nations are digging out this valuable ore, constructing it into "battleships," and using hundreds of millions of tons of coal in them, only to blow them to pieces to gratify our brutal instincts. Remember, the coal and ores—once gone—can never be replaced.

There is but one thing that can be replaced which can be used in erecting abodes, and also for motive power and fuel, viz: **The Forests.** But in destroying the forests we destroy the facilities for growing them or any other plant life. Cutting away the timber dries up the streams. See Photo 194. Referring again to the American Forest Congress report, here is what is said by Hon. John F. Lacey, Representative in Congress from Iowa: "I was born in the woods of Virginia. I moved to the

prairies, and one of the most unpleasant things of my subsequent life was to return to the woods of Virginia and find that the old streams and holes we used to swim in and where we used to go fishing are now gravelly roads! They are highways as dry and arid as the deserts of Arizona or New Mexico. Why is it? Because the trees have been cut down and the springs, the children

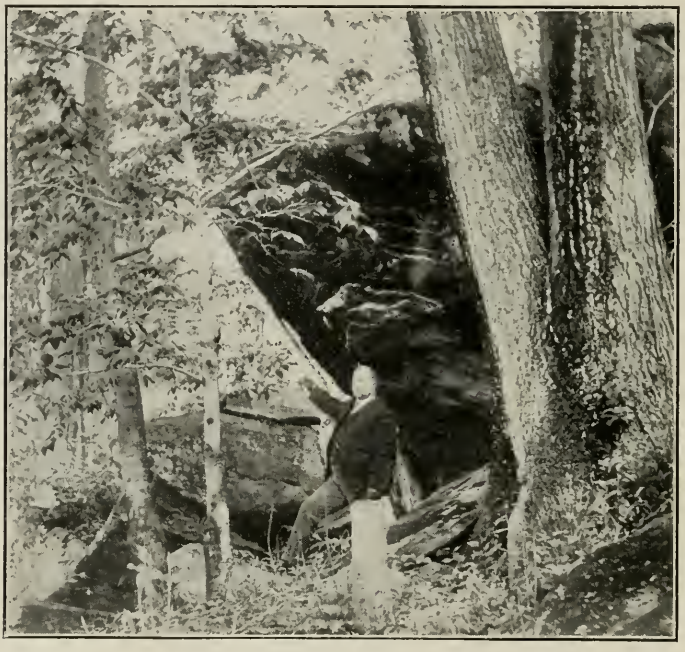

Photo 204, Wild Grandeur.

of the forests, dried up. Instead of a slow running brook, digging out holes here and there—clear as crystal—we have simply a torrent carrying pebbles and sand from the hills, then a desert."

From the same pamphlet I quote Mr. J. B. Lippingcott, Supervising Engineer, Reclamation Service: "A striking example of the output of a barren, treeless, drainage basin is shown in the case of Queen Creek, Arizona. This stream discharges only in violent freshets, recurring usually as great flood waves, subsiding almost as rapidly as they arrive. During the

larger part of the year the channel is almost dry. The area of the drainage basin is one hundred and forty-three square miles. In contrast with Queen Creek is Cedar Creek, in Washington. The drainage area is the same as Queen Creek. It is heavily timbered. In addition, the ground is covered with a heavy growth of ferns and moss. The total annual rainfall in Cedar Creek Basin, in 1896, was about eight times that in Queen Creek Basin, yet the maximum flood discharge per second is only three

Photo 205, Falling leaves.

thousand six hundred cubic feet for the former, while the maximum for the latter was nine thousand cubic feet per second. The mean discharge for Queen Creek was fifteen cubic feet per second and for Cedar Creek one thousand and eighty-nine cubic feet per second. These two streams represent extreme types. The radical difference in their character is largely due to forest cover."

The days of despair to advocates of reforestration are passing away. There were heard at the Forest Congress, President Roosevelt; M. Jusserand, Ambassador from France; Hon. James

Wilson, Secretary of Agriculture; Congressmen; Rev. Edward Everett Hale, Chaplain of Senate; Presidents of Railroads; Presidents of the great Lumber Companies; representatives of Women's Clubs, and a host of others. What appeared very encouraging was a part of the report of Mr. J. T. Richards, Chief

Photo 206

The Beauty of a Curve.

Engineer of the Pennsylvania Railroad System. Said he: "Within the last two years we have begun the planting of the Yellow Locust trees on an extensive scale on property owned by the Company." From what I can gather, a part of these plantings are on the lands along by the tracks, embankments, nooks and corners and strips of land such as I saw planted to them along the Juniata River, between Harrisburg and Altoona, Pa. Gentlemen, you are going to fail in such places. The plantings that I saw had received no cultivation, and long grass was grow-

ing among them. It will be bordering on the impossible to keep the fire out of the grass, and even if you could, with heavy sod on the roots, it will be years before they will be anything but gnarly runts. The first thing for this country to do is to recognize and then get fully acquainted with the laws that govern the growth of trees, as well as of corn or potatoes; and the main

Photo 207
View in Central Park, New York.

point in these laws is the production of a heavy root; you get the top as a reward for your work. You cannot produce healthy trees on barren clay, lifeless gravel beds, starved lands, or good land if covered with heavy sod.

There is not going to be a "wave" or "uprising" among the people to go into tree planting for obvious reasons, among which are these, viz; There is a great deal of working farms "on shares." Who, that is working "on shares," is going to plant trees? He would rather cut them down; his business is to "skin the land," he is a land robber, and the one who rents to him is

his ally. Then, the man who is laboring under a heavy mortgage, is he going to plant when he knows a "foreclosure" might befall him?

WHO WILL LEAD?

Within another thousand years humanity would perish from the face of the earth—without reforestration. There is but one people capable of leading the way in this movement, **the people of the United States of America.** They will do it, though the steps will be slow at first. It is the only country that has the scope of territory, variety of climate and, perhaps, I may add, the quality of land. The marvelous Eucalyptus tree of Australia is delighted with our mild climates. Catalpa Speciasa, formerly confined to the Wabash Valley, is at home almost anywhere. Preparatory to this great reforestry movement, (which must come, for the human race can't exist without it), **teach the children**; get them to understand the different kinds of trees and the types of each kind. Then have them learn of the character and form of the seed, teach them how to plant and care for

Photo 208

The use of Privet, Akron, Ohio.

these little baby trees, how to transplant them, etc. Thus in ten years you will have, or might have, ten million children raising plants for the future forests, and in these occupations they will be in touch with the most sacred influences known to the human heart—in touch with **Life** itself.

The future Forests will start in the American school-house and American home. Sad, sad indeed! will it be for those who have helped in destroying and wasting such a Divine Gift as the forests! But we learn from the mistakes of the past. The world will progress with its civilizing influences. I have unshaken confidence in the triumph of the **good** that is in man. He will learn the laws of moral and religious life from the **life** that he sees in the flower, shrub and tree.

A LOST POWER.

"What moves the business world?" "Money," says one. Mistake, sir! Money represents labor performed. The nations of the old world found America ripe for labor! Labor cut down the trees, and with them built houses, fenced farms, made fuel,

Photo 209, Sunshine and Shadows.

Photo 210

"Oh, beautiful Fall, with Bloom for All."

constructed railroads, reared towns, villages and cities, and built ships to sail the great rivers, lakes and oceans. The object in constructing the great trunk steam railroads of the country was what? To develop the country. The main lines are completed, and the electric roads are now in "the boom" of construction. Fifty years, (possibly twenty-five) will substantially complete these. How is this going to affect industrial America? What is back of the "prosperity" of to-day? Demand for iron and steel in, first, railroading; second, the building of cities. What necessitates the "city?" The bringing together of vast numbers of people to smelt the ore, "roll" it out for use, etc.

My American-born friend, have you pondered on what is coming? "Oh, something will turn up!" Yes, it will; with forests gone, and worn-out lands on hand, national poverty will "turn up," and stare you in the face, if you don't help to avert the calamity. There will continue to be inventions, but after the railroads are completed, and the great "boom" (caused by the demand for iron and steel) ceases, what are the teeming millions going to do that have drifted to the cities to obtain the high wages paid during this period of prosperity? **Go back to the land** to "raise their own living." Railroad traffic will decrease in pro-

Photo 211
Gathering wild Flowers, bank of Allegheny River.

portion. If we had the old forests to draw from we might keep up railroad traffic by the shipping and exporting of lumber; but inasmuch as the great power that moved the nation (the forests) is gone, there is but one thing to do to perpetuate that power,

Photo 212
"When the Apple Trees Shall Bloom."

viz; replanting and growing of new forests on scientific principles by individual, state and national enterprises. America must lead the world in this great international industry.

TWENTY FORMULAS FOR DESTROYING INSECTS, ETC.

There was a constant call coming in for formulas for the destruction of insects, "scale," fungous growth and the like, after the old "Tree Doctor" went before the public. It contained but few directions on these points, as it was supposed that about all

Photo 213

Where the Snow is Beautiful.

interested procured the various Bulletins issued by the State Experiment Stations or the U. S. Agricultural Department, but it seems that a host of people do not possess these or, being in pamphlet form, they are easily mislaid. Therefore I take one of the Ohio Experiment Station's Bulletins and annex it in full. I do this for two reasons: First.—It is as reliable as can be given, as this State has a splendid "Station," well equipped, managed by as capable and faithful workers as can be found in

any institution of the kind in any other State. Second.—Giving that which is reliable shields from the humbugs that are abroad in the land. I frequently get letters announcing that the writer has discovered some wonderful remedy for "plant lice," or something else, and suggesting that "there is money in the sale of it," and that he would be glad if I would introduce it, etc. (liberal commissions of course offered). With the highest appreciation of the work of the Ohio Experiment Station, I give you its formulas, and suggest that you heed all "cautions" given in the application thereof. They are found on the following pages; "Spray Calendars"—and all.

CALENDAR FOR TREATMENT OF PLANT DISEASES AND INSECT PESTS.

Prepared by W. J. Green and A. D. Selby.

This calendar for the treatment of diseased conditions in plants is designed to cover the needs of farmers and horticulturists. It was first prepared at the request of the Ohio Horticultural Society. Fungicides and insecticides may often be combined in spraying, and, where Bordeaux mixture is used for fungous diseases, this practice is recommended. Spraying young orchards with Bordeaux mixture from time of planting, and of stocks in nursery row, is strongly recommended to preserve healthy conditions.

REMEDIES.

FUNGICIDES.

1 **Bordeaux Mixture I.**

Copper Sulfate (blue vitriol) 4 pounds.
Quicklime (not air slaked) 4 pounds.
(Ordinary air slaked lime or hydrate of lime one-fourth more.)
Water to make 50 gallons.

Dissolve the copper sulfate in about two gallons of hot water, contained in a wooden vessel, by stirring, or even better by suspending the sulfate, contained in a cheese cloth sack, in a large bucketful of cold water. With the cold water and cheese cloth bag a longer time is required. Pour the sulfate solution into the barrel or tank used for spraying, and fill one-third to one-half full of water. Slake the lime by addition of a small quantity of water, and when slaked cover freely with water and stir. Pour the milk of lime thus made into the copper sulfate,

straining it through a brass wire strainer of about 30 meshes to the inch. Pour more water over the remaining lime, stir and pour into the other; repeat this operation until all the lime but stone lumps or sand is taken up in the milk of lime. Now add water to make 50 gallons in the tank. After thorough agitation the mixture is ready to apply. The mixture must be made fresh before using, and any left over for a time should be thrown out.

2 **Bordeaux Mixture II.**

Copper sulfate, 2 pounds.
Quicklime, 2 pounds.
(Or dry air slaked or hydrate of lime one-fourth more.)
Water to make 50 gallons.

For use on such trees as have foliage injured by Bordeaux I.

Stock solution and lime putty.

A solution of copper sulfate, containing say one pound of sulfate to the gallon of water, may be made up and permitted to stand indefinitely in a covered barrel if no lime is added. Such a solution is known as a stock solution and two or four gallons of this stock solution, according to the strength desired, is taken for each 50 gallons of the mixture to be made. For extensive spraying, a long trough or box of uniform width may be used, in which to slake and keep the lime. The quicklime is weighed out according to the amount needed, immediately placed in the trough and slaked with a small quantity of water. The whole is evenly spread and covered as a putty with water to exclude the air. This putty may be removed in calculated portions, placed in a tub and treated like the freshly slaked lime. By means of stock solution of copper sulfate and the lime in putty state, much valuable time is saved in filling the barrels or tanks used in spraying.

3 **Ammoniacal Solution of Copper Carbonate.**

Copper carbonate, 6 ounces.
Ammonia, about 3 pints.
Water, 50 gallons.

Dissolve the copper carbonate in the ammonia and add the water.

Caution—Use no more ammonia than is required to dissolve the copper carbonate. Ammonia is variable in strength, and the amount required must be tested in practice.

To make copper carbonate: Dissolve ten pounds copper sulfate **(blue vitriol)** in ten gallons of water, also twelve pounds of carbonate of soda in same quantity of water. When cool, mix the two solutions slowly, stirring well. Allow the mixture to stand twelve hours and settle, after which pour off the liquid. Add the same quantity of water as before, stir and allow to stand the same length of time. Repeat the operation again, after which drain and dry the blue powder which is copper carbonate.

4 **Soda Bordeaux Mixture.**

Copper sulfate, 4 pounds.
Commercial caustic soda, soda lye, **(sodium hydroxid)** slightly in **excess** so that mixture is alkaline—according to strength, 1 lb. 5 oz. to 1 lb. 8 oz. by testing.
Water to make 50 gallons.

To use instead of ammoniacal copper carbonate.

Warning—In each case of change of grade or brand of commercial caustic soda it will be necessary to test the strength. Keep the mixture well agitated.

To keep caustic soda—After opening a container and testing, weigh out the entire contents into portions such as are needed to make a single spray tank of mixture; put in Mason jars under shelter, cover with a pint or so of water, and this portion is ready to be used as needed. Opened packages of caustic soda will absorb water and increase in weight on standing; unopened packages will usually keep for a year or more.

5 **Potash Bordeaux Mixture.**

Copper sulfate, 4 pounds.
Caustic potash, potash lye, **(potassium hydroxid)** 1 lb. 5 oz. to nearly 1 lb. 8 oz. as necessary for **slight excess.** (See soda Bordeaux.)
Water to make 50 gallons.

For use like soda Bordeaux mixture instead of ammoniacal copper carbonate.

Caution—Prepare like soda Bordeaux, only after test of the strength of the caustic potash.

6 Copper Sulfate Solution.

Copper sulfate, 4 pounds.
Water to make 50 gallons.

Dissolve the sulfate as directed in Bordeaux I.

Caution—The solution will injure foliage. It can be used only before the buds open.

7 Potassium Sulfid Solution.

Potassium sulfid (liver of sulfur) 1 ounce.
Water, 3 to 4 gallons.

This solution will not remain unchanged. The potassium sulfid must be kept in a well stoppered bottle. This may be made by a similar process to that of No. 8.

8 Sodium Sulfid Solution.

Commercial caustic soda, 2½ lbs.
Flowers of sulfur, 5 lbs.
After solution, water to make 50 gallons.

To make sodium sulfid at lowest cost: Place the caustic soda in a metal vessel and add a little hot water. Then stir in sulfur gradually, adding meanwhile hot water or applying heat. The chemical reaction will generate heat. With its progress the color will change from yellow to nearly brick red. No heat is required after complete solution unless lime be added. Don't add excess of water until the solution is effected. It may be made in quantity with external heat and kept during a day as stock solution. Excess of lime may be added with double or triple portion of sulfur to make the possible equivalent of lime, sulfur and salt solution.

Caution—This solution is prepared for application on dormant trees. Care must be observed.

Upon foliage, as of peach, a strength greater than 1 lb. caustic soda to 2 lbs. sulfur is not to be recommended.

To make sodium sulfid for **treating seed potatoes**, use at the rate of 1 lb. caustic soda to 10 oz. sulfur for 36 gallons of solution.

9 Calcium Sulfid (Lime Sulfid).

Quicklime, 1 to 2 pounds.
(Or dry air slaked lime or hydrate of lime, one-fourth more.)
Flowers of sulfur, the same amount.
Water, 50 gallons.

Proceed as directed for first steps in making lime, sulfur and salt mixture. Heat till the color has become red, showing the formation of the lime sulfids. This will require an hour or more. Dilution while warm is to be preferred, but the solution should cool somewhat before applying on foliage.

Caution—While this may be used on the peach in foliage, and upon other fruits, care should always be exercised in the preparation to avoid injury to the foliage from the application.

10 Formalin.

For oats and wheat, 1 lb. formalin to 50 gallons of water.
For potato scab and rosette, ½ pint of formalin to 15 gallons water.
For onion smut, 1 lb. of formalin to 25 or 33½ gallons of water.

INSECTICIDES.

11 Kerosene Emulsion.

Dissolve one-half pound hard soap in one gallon of water (preferably soft water) and while still boiling hot, remove from the fire and add two gallons of kerosene. Stir the mixture violently by driving it through a force pump back into the vessel until it becomes a creamy mass that will not separate. This requires usually from five to ten minutes. The emulsion is then ready to be diluted with water and applied. For the common scale insects and hard bodied insects, like the chinch bug, use one part emulsion to eight to ten parts of water. For soft bodied

insects (plant lice, etc.), use one part emulsion to fifteen or twenty parts water.

Kerosene emulsion kills by **contact**, and therefore the application should be very thorough. It may be used against a great many different pests, but is especially valuable for destroying those with sucking mouth-parts, for they cannot be killed with arsenical poisons.

Caution—Only the dilute emulsion, 1 part emulsion to 15 or 20 of water, should be used when the trees are in leaf, and in all cases it should be kept thoroughly stirred; otherwise the foliage or even the twigs will be injured.

12 Paris Green.

In combination with Bordeaux mixture, Paris Green may be used at the rate of one pound to 175 to 200 gallons.

When Bordeaux mixture is unnecessary, the Paris Green may be used at the same rate, but two or three pounds of freshly slaked lime must be added to prevent burning of foliage. Keep the mixture well stirred so that the poison will be distributed evenly.

In cases where successive sprayings are necessary it is important to consider the accumulation of the poison and use a slightly weaker mixture, unless sufficient rain has fallen to wash off the poison thoroughly.

13 Arsenate of Lead.

Arsenate of soda, 4 ounces.
Acetate of lead, 11 ounces.
Water, 16 gallons.

Dissolve each separately in two quarts of warm water; mix and add water to make sixteen gallons. Arsenate of lead can be purchased from Swift Bros. Insecticide Co., Boston, Mass., or under the name of Disparene from Bowker Insecticide Co., Cincinnati, Ohio. It should be used at the rate of three pounds to fifty gallons of water. It is perhaps the best of the arsenical poisons in adhering qualities. This material may be used alone or in Bordeaux mixture.

14 London Purple.

If desirable, London purple may be substituted for Paris green, but it has the disadvantage of being somewhat variable in composition and containing more soluble acid. For the latter reason use it somewhat weaker, or else with an abundance of lime, so as to prevent burning of foliage, or in Bordeaux mixture. It has the advantage of not settling as readily as Paris green.

15 White Hellebore.

Hellebore is often employed in cases where arsenical poisons would be objectionable. Use one ounce to three gallons of water.

16 Pyrethrum.

Pyrethrum is usually applied as a powder, with a bellows, but may be used as a spray at the rate of one ounce to two gallons of water.

17 Whale Oil Soap Solution.

Use from one to two pounds of the soap to one gallon of water. Be sure that the soap is thoroughly dissolved, and then apply in the form of spray.

18 Arsenite of Soda.

Dissolve two pounds of commercial white arsenic and four pounds of carbonate of soda (washing soda) in two gallons of water and use one and one-half pint to a barrel of Bordeaux mixture (50 gallons).

The easiest way to make the solution is to put both the white arsenic and carbonate of soda in a gallon of boiling water and keep boiling about fifteen minutes, or until a clear liquid is formed, and then dilute to two gallons.

Caution—This cannot be used alone safely, but must be applied in Bordeaux mixture.

19 Crude Petroleum.

Caution—Use a fine nozzle and exercise great care to avoid overspraying. It requires a careful workman to spray peach trees with crude petroleum, as too much of the material, especially on the bodies of the trees, is likely to do harm. Lime-sulfur-salt is quite as efficacious and safer to use than crude petroleum.

20 Lime, Sulfur and Salt.

Stone lime, 15 to 30 lbs.
(Or dry air slaked lime or hydrate of lime one-fourth more).
Flowers of sulfur, 15 lbs.
Salt, 15 lbs.
Water, 50 gallons.

Slake the lime in a small quantity of hot water, gradually adding and thoroughly stirring in the sulfur. Dilute mixture with twelve gallons of water and boil in an iron kettle or cook by steam in a covered tank or barrel for one and one-half hour. Then add salt, continuing the boiling for one-half hour more. Fill vessel up with water to the required fifty gallons. Strain the wash through a fine mesh strainer and apply hot. In using an iron kettle keep the mixture vigorously boiling and thoroughly stirred to prevent caking and burning of materials. Wash cooked by steam is more easily prepared and better made. Apply the wash just as the buds begin to swell in the spring. Cover all parts of the tree with a heavy coat of the wash. The wash seems best adapted to orchardists who have not yet learned to use petroleum with safety or are afraid that their trees are beginning to show injury from the oil or will not stand many more applications of it. **It is especially recommended for the treatment of peach trees for San Jose Scale.**

It is believed that the substitution for the salt of one and one-fourth pound of blue vitriol dissolved in hot water results in a quicker acting wash. This formula is known as the Oregon Wash.

SEED AND SOIL TREATMENT

SEED OR PLANT	FOR WHAT TREAT'D	TREATMENT	METHOD OF TREATMENT
Barley	Smuts	Modified hot water	Soak seed enclosed in sack four hours in cold water, let stand wet four hours more and dip five minutes in hot water at 130 degrees Fahr., or three degrees lower than for other hot water treatments.
Bean	Anthracnose	(See spray calendar)	
	Weevil	Bisulfid of carbon	Submit to fumes for twenty-four hours in air tight vessel or chamber.
Begonia	Nematodes	Heat soil with steam	Disinfect soil to be used by heating with steam as described under cucumbers.
Cabbage and Cauliflower	Club root	Quicklime on soil	Apply stone lime (quicklime) preferably ground lime, before planting, at rate of 80 bushels per acre and work into the soil with suitable tools.
	Maggot	Bisulfid of carbon	Make hole in soil near roots, pour in about a teaspoonful of bisulfid of carbon and fill hole with soil.
Cucumber	Nematodes in hot-house	Heat soil with steam	Heat earth before using in special box for three hours with 60 pounds of steam or four hours with 40 pounds.
Oats	Loose smut	Immerse seed in hot water. Soak seed in pots, sulfid. Sprinkle seed with formalin or copper sulfate	Immerse seed contained in open vessel for ten minutes in hot water at 132-3 degrees Fahr., for seven minutes at 136 degrees Fahr., or for five minutes at 140-2 degrees Fahr., spread at once to dry. (2) Soak seed in $\frac{3}{4}$ per cent. solution potassium sulfid for twenty-four hours with stirring, then dry. (3) Sprinkle a pile of seed to saturate with formalin or copper sulfate, one gallon to bushel; after three or four hours or over night in pile spread to dry, With copper sulfate use lime in drying.
	Insects in stored grain	(See Wheat)	
Onion	Smut	Use formalin or ground quicklime. Plant other crop. Use sets or transplanted seedlings	Use formalin solution 1 lb. to 30 gals. of water sprinkled on seed in contact with soil and cover at once, or better sow with drill and drill attachment, the solution falling with the seed. Or apply ground quicklime at the rate of seventy-five to one hundred and twenty-five bushels per acre just previous to seeding on freshly plowed land, and stir into soil.
Potato	Scab	Soak uncut seed in formalin	Soak seed for two hours in formalin; then dry and plant on scab-free soil.
	Rosette (Rhizoctonia)	Soak seed as for scab	Soak seed as for scab; on infected soil use formalin after manner in onion smut.
Roses	Nematodes in hot-house	Heat soil with steam	Heat soil with steam as described above; thoroughly disintegrated soil from sod one year or more old is less dangerous. Lime water stimulates affected plants but is not a remedy.
Sweet Potato	Bin Rot	Use flowers of sulfur in soil	Make dope one part flowers of sulfur and six parts earth; drop handful and set plant through it.
	Soil Rot	Use flowers of sulfur	Same as above.
Tobacco	Root rot or black root	Plant beds on new soil	Avoid old plant bed soil.
Tomato	Nematodes in hot-house	Heat soil with steam	As for roses and cucumbers above.
	Point rot in hot-house	Mulch or sub-water	An insufficient water supply seems favorable to development of point rot of green tomatoes.
Turnip	Club root	Quicklime in soil	As for cabbage and cauliflower. Avoid succession of these crops.
Violet	Nematodes in hot-house	Heat soil with steam	The time for prevention is by soil treatment beforehand as for cucumbers above.
Wheat	Loose smut	Modified hot water	Soak seed four hours in cold water, let stand four hours more in wet sacks, immerse five minutes in water at 133 degrees Fahr. and dry.
	Stinking smut	Hot water, copper sulfate or formalin	Dip skimmed seed for ten minutes in hot water at 133° Fahr. and dry on disinfected surface, or immerse ten minutes in solution of blue vitrol (copper sulphate); dry with air slaked lime by shoveling. Use two pounds of blue vitrol to ten gallons of water. Grain may be sprinkled with copper sulfate or formalin, as for oats.
	Insects in stored grain	Bisulfid of carbon	Place one pound of bisulfid of carbon for each 2,000 pounds of grain in bins. Cover surface with blankets to hold the fumes which will spread through the mass, killing all insect life. Use in tight bins or buildings and do not use near fire of any description.

SPRAY CALENDAR

WHAT TO SPRAY	FOR WHAT TO SPRAY	WITH WHAT TO SPRAY	WHEN TO SPRAY				REMARKS AND CAUTIONS
			FIRST SPRAYING	SECOND SPRAYING	THIRD SPRAYING	FOURTH SPRAYING	
Apple	Bitter-rot	Soda Bordeaux or ammoniacalcopper carbonate	With first appearance of rot	One to two weeks after first	Two weeks later	Not required if Bordeaux precedes	These follow Bordeaux for scab; danger on fair skinned apples.
	Scab	Bordeaux mixture 1	As buds are swelling	Just before blossoms open	Just after blossoms drop	7 to 10 days later	
	Sooty fungus	Bordeaux I	After blossoms drop	Two weeks later	Same as for scab	Same as for scab	
	Bud moth	Arsenites in Bord	With opening of bu s				
	Canker worm	Arsenate of lead alone	With fir t young worms	2 or 3 days later if worms remain	Same as second		12, 13, 14 or 18 in Bordeaux are not quite as efficient as arsenate of lead alone.
	Codlin moth	Arsenites in Bordeaux I or arsenate of lead, 3 lbs. to 50 gallons	As soon as blossoms fall	7 to 10 days later	Same as for scab	Same as for scab. Arsenate of lead alone on light colored apples	
	San Jose scale	19 or 20	Late in wi ter or early in spring				Crude petroleum does not injure apple trees, but the lime, sulfur and salt mixture is quite as good.
	Oyster shell scale Scurfy scale	Lime wash (1) Kerosene emulsion (2) or (20)	Early winter with (1)	June 10-15 with (2)			Don't use strong emulsion when trees are in full leaf.
	Wooly aphis	Kerosene emulsion	When trees are not in full leaf	In fall			
Aster	Blister beetle	Whale oil soap	When beetles appear				Use 1 pound soap to 6 gallons water.
Asparagus	Asparagus beetle	Lime or pyrethrum	Early spring				Do not use arsenites, except in late summer.
	Asparagus rust	Bordeaux I	After cutting crop	Ten days later	Ten days later	Ten days later	Repeat 3 to 4 times. Burn rusted brush in fall.
Bean	Anthracnose	Bordeaux I	Soak seed 1 to 2 hours in am.carb. five times strength of 3	Bordeaux on 2 or 3 in. plants	Bordeaux ten days later	After blossoms	Repeat if needed.
Beet	Leaf spot	Bordeaux I	When plants are 5-6 in. high.	Two weeks after first	Two weeks later		

SPRAY CALENDAR—Continued

WHAT TO SPRAY	FOR WHAT TO SPRAY	WITH WHAT TO SPRAY	WHEN TO SPRAY				REMARKS AND CAUTIONS
			FIRST SPRAYING	SECOND SPRAYING	THIRD SPRAYING	FOURTH SPRAYING	
Cabbage and Cauliflower	Cabbage worm	Pyrethrum	With first appearance of worms	Whenever worms are observed			1 oz. to 30 gallons water, or dust 1 to 10 of flour.
	Club root	(See soil treatment)					
Carnation	Leaf or calyx mould	Bordeaux I or ½ of 6	Upon appearance of fungus	Two weeks later	Two weeks later	Repeat if needed	Begin early before the calyces are ruined.
	Leaf spot	Bordeaux I or ½ of 6	Upon appearance of fungus	Two weeks later	Two weeks later	Cover foliage well	Keep leaves well covered in plant bed.
Celery	Leaf spot or leaf blight	Bordeaux I	On young seedlings	Repeat on seedlings	Before or after transplanting	Two weeks later	
Cherry Stocks	Leaf spot	Bordeaux II	When leaves are half grown	Two weeks later	Two weeks later	About two weeks later	First after blossoming. Possibly necessary to treat after crop is gathered.
Cherry	Leaf spot	Bordeaux II	When leaves are unfolding	Two weeks later	2 or 3 weeks after second		
	Rot (?)	Bordeaux I and II	Before blossoming I	After blossoms drop, II on fruit	Two weeks later II on fruit	Two weeks later II, 3 or 4	Use 3 or 4 when fruit is large.
	Aphis	Whale oil soap	On first appearance of aphis				Difficult to reach aphis. Use 1 lb. soap to 4 gal. of water.
	Cherry slug	Arsenites In Bord. I	When slugs appear	Repeat if slugs remain			Air slaked lime may be used.
	Curculio	Arsenites In Bordeaux I and II	Before blossoming in I	As blossoms dry up in II	One week later in II		Avoid strong solutions. See 19
	San Jose Scale	Whale oil soap solution or 20	Before buds open				
Cineraria	Mildew	Bordeaux I or ½ of 6	When mildew appears in spring	Two weeks later	Repeat if necessary		
Chrysanthemum	Leaf spot	Bordeaux II or ½ of 6	July 1	Two weeks later	Repeat if necessary		

SPRAY CALENDAR—Continued

WHAT TO SPRAY	FOR WHAT TO SPRAY	WITH WHAT TO SPRAY	WHEN TO SPRAY				REMARKS AND CAUTIONS
			FIRST SPRAYING	SECOND SPRAYING	THIRD SPRAYING	FOURTH SPRAYING	
Cucumber	Anthracnose	Bordeaux I	When plants begin to vine	Two weeks later	Two weeks later	two weeks later	Repeat as necessary.
	Downy mildew	Bordeaux I	July 25 to August 1	Eight to ten days later	Eight to nine days later	Eight days later	Repeat at weekly interval.
	Spot of fruit	Bordeaux I	After first blossoms	Ten days later	Two wks after second	Two weeks after third	Apply to fruit carefully.
	Nematodes	(See soil treatment)					
Currant	Leaf spot	Bordeaux I	As leaves are unfolding	Two weeks later	Two weeks later	Two or three weeks later	Four necessitates washing fruit. See 19.
	Plant bug	Kerosene emulsion	May	Early in June if necessary			
	San Jose Scale	Whale oil soap solution or 20	As with the apple	In spring as with apple			
	Worm	White hellebore	When worms first appear	In 3 or 4 days repeat	Repeat as second		Look for worms on under side of leaves first.
Gooseberry	Leaf spot	Bordeaux I	As currants with leaf spot	As currants with leaf spot	As currants with leaf spot	As currants with leaf spot	This remedy is very sucessful
	Mildew	Bordeaux I or 7	Before leaves open I	After blossoming I	Potas. sulfid 2 weeks later		Bordeaux coats fruit if used for 3rd. Sodium sulfid may be substituted for 7.
	Worm	White hellebore	As on currants				
Grape	Anthracnose	Bordeaux I	Just before buds open	Just before blossoming	Just after fruit has set	Ten days later Bord.	Don't spray after fruit is half grown.
	Berry moth	Arsenites with Bordeaux I		After fruit has set	Ten to fourteen days later		Do not spray with arsenites after July 1st.
	Downy & powdery mildew	Bordeaux I	Just before blossoming	After fruit has set	Ten to fourteen days later		Covered by spraying for anthracnose or rot.
	Rot	Bordeaux I and 3 or 4	Just before blossoming Bordeaux I	Just after fruit has set I	Seven or eight days later	7 or 8 days later Bord. I	Follow by two or three sprayings with Sodo Bordeaux or am. cop. carbonate.
	Leaf hopper	Kerosene emulsion	Before young can fly				

SPRAY CALENDAR—Continued

WHAT TO SPRAY	FOR WHAT TO SPRAY	WITH WHAT TO SPRAY	WHEN TO SPRAY				REMARKS AND CAUTIONS
			FIRST SPRAYING	SECOND SPRAYING	THIRD SPRAYING	FOURTH SPRAYING	
Horse Chestnut	Leaf spot or blight	Bordeaux I	When leaves are half grown	Two weeks later	Two weeks after 2nd	Two to three weeks later	
Muskmelon	Anthracnose	Bordeaux I and II	In seed bed or when plants begin to vine Bordeaux II	Two weeks later, Bord. I	Two weeks later	Two weeks later	Repeat as necessary: use II very early.
	Downy mildew	Bordeaux I	July 25 to August 1	Eight to ten days later	Eight or 9 days later	Eight days later	Repeat same.
	Leaf blight	Bordeaux I	When plants begin to vine	Three weeks later	Three weeks after second	Two weeks after 3d	
Oat	Smut	(See seed treatment)					
Pea	Mildew	Bordeaux I	When mildew appears	Two weeks later	Repeat if needed		
Peach	Leaf curl	Bordeaux I, or 6	In fall, or March, Bord. I, 6 or 20	As buds are opening I, 6 or 20	Just after calyx drops Bordeaux II	Not required, ditto 3d, if others are well done	Lime-sulfur-salt for first when scale is present instead of Bordeaux I.
	Pustular spot	Bordeaux II	Just after calyx drops	Two weeks after first	Two weeks later		Cover fruit well.
	Rot	Bordeaux I and II	As buds are swelling 1 or 20	Just after calyx drops II	Three or four weeks later II	As fruit begins to color, II	Every 7-10 days repeat. Destroy all mummies, 3 may be used 4th.
	Scab	Bordeaux I, 6 or 8	As buds are swelling Bordeaux I, 6 or 8	Just after calyx drops Bordeaux II	Two weeks later Bordeaux II, 8 or 9	Repeat third	
	Bud moth	Arsenites in Bordeaux I	With opening of buds				Use only half usual amount of poison.
	San Jose scale	Lime, sulfur, salt	In winter or early spring				If 17 is applied. Use only in spring as buds are opening.
Pear Stock	Leaf spot or blight	Bordeaux I	When leaves are half grown	Two weeks later	Two weeks later	Two weeks later	5 to 7 sprayings are needed.
Pear	Leaf blight	Bordeaux I & 3 or 4	Before blossoms open	Two weeks later, I or 3	Two weeks after 2nd	Bordeaux may make russet fruit	Use 3 for 31, not Bordeaux after 2nd. Bordeaux after second may injure the fruit
	Scab	Bordeaux I	When leaves are half grown	After blossoms drop			

SPRAY CALENDAR—Continued

WHAT TO SPRAY	FOR WHAT TO SPRAY	WITH WHAT TO SPRAY	WHEN TO SPRAY				REMARKS AND CAUTIONS
			FIRST SPRAYING	SECOND SPRAYING	THIRD SPRAYING	FOURTH SPRAYING	
Pear (Con)	Bud moth	Arsenites in Bord. I	With opening of buds				
	Canker worm	Arsenate of lead					See apple.
	Codlin moth	Arsenites in Bord. I	As with the apples	Same as first			See apple.
	San Jose scale	No. 20	In winter or early spring				
	Slug	Arsenites in Bord. I or dust with slaked lime	When slugs appear	Repeat if slugs remain			
Plum	Rot	Bordeaux I, also 3 or 4	As buds are swelling I or 20	Just after calyx drops I	Three or four weeks later I	As fruit begins to color, use 3 or 4	Every 7 to 10 days repeat 4th; useless to spray for rot, unless mummies are destroyed.
	Shot-hole fungus	Bordeaux I	When leaves are half grown	Three weeks later	Three weeks later if needed		
	Curculio	Arsenites in Bord. I	With starting of buds	Just after calyx drops	Five days later		Jar, gather and destroy curculios and stung plums in addition.
	Aphis	Whale oil soap	On appearance of aphis				Use 1 lb. soap to 6 gal water.
	San Jose scale	No. 20	In winter or early spring				
Potato	Early blight	Bordeaux I	When plants are 6 in. high	Two weeks later	Two weeks later	Two weeks later if needed	
	Late blight	Bordeaux I	As for early blight to July	July 15-20	Two weeks later	8 to 10 days later	Repeat at 7 to 8 day intervals till crop is mature.
	Rosette	(See seed treatment)					
	Blister beetle	Whale oil soap	When beetles appear	Repeat is necessary			Use 1 lb. to 6 gallons of water.
	Colorado beetle	Arsenites alone or in Bordeaux I	When beetles or young appear	As for first			Arsenate of lead, 3 lbs. to 50 gallons of water, for Colorado beetle alone.
	Flea beetle	Bordeaux I	When beetles appear	Repeat if necessary	As for first & second		

SPRAY CALENDAR—Concluded

WHAT TO SPRAY	FOR WHAT TO SPRAY	WITH WHAT TO SPRAY	WHEN TO SPRAY				REMARKS AND CAUTIONS
			FIRST SPRAYING	SECOND SPRAYING	THIRD SPRAYING	FOURTH SPRAYING	
Quince Stocks	Leaf spot	Bordeaux I	When leaves are half grown	About two weeks later	Two weeks later	Two weeks later	Perhaps 5th spraying will be needed.
Quince	Leaf spot	Bordeaux I	As buds are swelling	When leaves are half grown	Two weeks later	Two weeks later	Second should come after blossoms drop.
	Fruit and leaf spot	Bordeaux I	Before blossoms open	After blossoms drop	Two weeks after second	Two weeks later	
	San Jose scale	No. 20	In winter or early spring				
Raspberry and Blackberry	Anthracnose	Bordeaux I and II	Before leaves open use I	II on young canes 6 in. high	Repeat second one week later		Keep spray from leaves on bearing canes.
	Leaf spot	Bordeaux I	When leaves are half grown	Two weeks later	Two weeks later		
	Saw fly	Pyrethrum or hellebore	As for currant worm	In three or four days repeat			
Rose	Leaf spot	Bordeaux I or ½ of 6	With first appearance of fungus	Two or three weeks later	Repeat if necessary		Bordeaux shows on plants.
	Nematodes	(See soil treatment)					
	Slug	Arsenites in Bord. II or hellebore	On appearance of slugs	Repeat if needed			
Sugar Beets	Leaf spot	Bordeaux I	With first appearance of spots	Two or three weeks later	Two or three weeks later	Three weeks later if needed	
	Blister beetle	Whale oil soap	When beetles appear				Use 1 lb. to 6 gallons of water.
	Flea beetle	Bordeaux I	When beetles appear				
Tobacco	Root rot	(See soil treatment)					
Tomato	Anthracnose	Bordeaux I	Soon after fruit begins to set	Three weeks later	Three weeks later		
	Leaf blight	Bordeaux I	Three weeks after transplanting	Three weeks after first	Three weeks later	Three weeks later	
	Point rot	(See soil treatment)					
Watermelon	Anthracnose	Bordeaux II	When plants begin to vine	Three weeks after first	Two weeks later	Three weeks later	Bordeaux I. Some danger.
	Downy mildew	Bordeaux II	July 25 to August 1	Eight to ten days later	Eight to nine days later	As for cucumbers	
	Leaf blight	Bordeaux II	As disease appears on muskmelons	Repeat as on muskmelons	As on muskmelons		